Community Programs

"Individual Facilities for Rural Water and Waste Disposal"

INDIVIDUAL FACILITIES FOR RURAL WATER AND WASTE DISPOSAL

U.S. DEPARTMENT OF AGRICULTURE

FARMERS HOME ADMINISTRATION

APRIL 1986

FOREWORD

Farmers Home Administration (FmHA) is the credit agency for Agriculture and Rural Development within the U.S. Department of Agriculture (USDA). Its history of financial and technical assistance in rural areas of America goes back more than 50 years. Today FmHA continues one of its missions of providing supervised credit and technical assistance to eligible applicants for water and waste disposal facilities.

Facilities financed by FmHA are intended to perform a service for the users of the facility. The technical approach is only a means to that end. Recognizing the characteristics peculiar to small rural communities and rural areas and their service needs is the beginning to understanding the issues and problems. Fully evaluating viable alternative technologies in accordance with sound engineering and financial practices is the beginning to the solution.

Point-of-use water treatment methods and onsite wastewater treatment methods are viable alternatives which deserve consideration under appropriate conditions. This document identifies the issues and evaluation factors which may be used to determine if point-of-use or onsite technologies are cost effective and practical solutions. The actual determination of the appropriate technology should be made within a framework which recognizes the issues raised in this study and should be made on a project-by-project basis where full consideration could be given to such items as eligibility, priority, cost effectiveness, feasibility, environmental and management issues.

VANCE L. CLARK
Administrator

ABSTRACT

The document is a report to Congress by the Farmers Home Administration (FmHA), U.S. Department of Agriculture, on issues and evaluation factors which may be considered to determine if individual facilities are a cost effective and practical alternative to central water and sewer systems in rural areas. FmHA legislation and regulations pertaining to rural water and waste disposal facilities are reviewed and provide a basis for financing individual facilities in rural areas through FmHA's Water and Waste Disposal loan and grant program. A range of issues and problems are discussed which must be evaluated in making a determination if a project would be eligible for FmHA assistance. Economic criteria used in the evaluation are discussed and individual facilities and central systems are compared from an environmental viewpoint. Finally, the report examines several Federal and State regulations and policies which may impede the development of individual systems.

The report is submitted in fulfillment of Title XIII, Section 1304(b)(1), of the Food Security Act of 1985, Public Law 99-198.

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ACKNOWLEDGEMENTS

The preparation of this report was coordinated by Farmers Home Administration (FmHA), Washington, D.C. Several FmHA financial and technical staff members contributed to the document. The report was reviewed by professionals involved in the water and wastewater field.

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1. SUMMARY

The Food Security Act of 1985 requires that the Farmers Home Administration (FmHA) conduct a study of the practicality and cost effectiveness of making rural water and waste disposal loans and grants at individual locations rather than central locations. The study is limited to facilities that can be financed under Section 306 of the Consolidated Farm and Rural Development Act, as amended (7 U.S.C. 1926).

FmHA has authority to provide financial assistance to develop water and waste disposal facilities in rural areas and towns up to 10,000 people. This service may be provided through individual installations or small clusters of users within an applicant's service area. Detailed requirements can be found in 7 C.F.R. 1942.

For onsite wastewater systems, FmHA agrees with the Environmental Protection Agency's assessment that individual sewage options offer a viable means for controlling public health hazards, environmental degradation, and nuisances that might otherwise arise from wastewater generated in unsewered areas. If onsite systems are to perform successfully over a reasonable lifetime, a sound management program with sufficient technical assistance and enforcement capabilities is needed.

Point-of-use water system concepts are not as favorably perceived by Federal and State regulators as compared to central systems. FmHA recognizes that point-of-use treatment may present an efficient cost effective method to correct drinking water contamination. However, potential problems may occur when using this approach with the loss of management control normally found on central systems. When point-of-use treatment is selected as the alternative, a strong management program is essential to assure that all users receive safe and sanitary drinking water.

The environmental impacts of individual systems vary from central systems. Because central systems are normally built over a shorter period of time and confined to more limited geographical areas, their construction impacts are greater than those of individual systems. During their operational lives, individual systems malfunction more often than central systems because of the greater number and dispersion of treatment units involved, but the environmental impact per malfunction is greater for a central system. The design and location of both types of systems can lead to long-term adverse land use impacts if not coupled with a strong, local land use planning process.

The objective of an economic evaluation is to establish and quantify the "measure" or "measures" which best represent the cost or savings of alternative designs. The cost or savings measures are then used in the cost effectiveness evaluation. The costs to be considered include: first

cost of the facility, maintenance cost to keep the facility in good working order, operation cost to keep the facility functioning on a daily basis, and replacement cost of major components which will eventually wear out. Also considered is the value of the facility at the end of the planning period which is determined by such concepts as: salvage value, depreciated value, and value in use. Cost and values are discounted using standard economic evaluation methods. The point of view in the analysis is that of the good use of resources and real costs.

2. BACKGROUND

Food Security Act of 1985, Public Law 99-198

The Act requires Farmers Home Administration (FmHA) to study the practicality and cost effectiveness of making Rural Water and Waste Disposal loans and grants at individual locations. Specifically, Section 1304(b) of the Act states:

(1) The Secretary of Agriculture shall -

(A) Conduct a study of the practicality and cost effectiveness of making loans and grants under Section 306 of the Consolidated Farm and Rural Development Act (7 U.S.C. 1926) for the construction of water and waste disposal facilities in rural areas at individual locations, rather than central or community locations; and

(B) In such study consider the feasibility of small multiuser drinking water facilities, the costs involved in connecting rural residents into the community water systems, and alternative rural drinking water systems.

(2) Not later than 120 days after the date of enactment of this Act, the Secretary shall submit a report on the results of the study required under paragraph (1) to the Committee on Agriculture of the House of Representatives and the Committee on Agriculture, Nutrition, and Forestry of the Senate.

The legislative history of this provision began with a Senate amendment requiring FmHA to study the practicality and cost effectiveness of making loans and grants for the construction of water and waste disposal facilities at individual locations in rural areas, rather than at central or community locations.

The original House bill (H.R. 2100) contained no comparable provision.

The conferees adopted the Senate provision with an amendment specifying that the study also focus on small multiuse drinking water facilities, costs involved in connecting rural residents into community water systems, improvements to small community water systems, and alternative drinking water systems.

Scope of Study

To determine how to study the issues raised in the Act and how to put the information in a usable document, FmHA considered the following:

The Act limits the study to loans and grants for water and waste disposal facilities authorized by Section 306 of the Consolidated Farm and Rural Development Act. Section 306 only permits loans and grants to associations such as public bodies, not-for-profit corporations, and Indian tribes. This section does not authorize loans and grants to individuals for owner-operated individual facilities or for any facilities owned and operated by profit-seeking entities. Therefore, only individual facilities operated and maintained by associations were considered in this study.

The study must provide readers with usable information covering a range of ownership, operation and maintenance options.

The study is limited to describing the available technology on individual and small multiuser water and waste disposal facilities, FmHA existing regulations, and the various cost and environmental factors to consider when evaluating individual versus central facilities.

Definitions

In this report, water and waste disposal facilities at individual locations are referred to as point-of-use facilities for drinking water supply and onsite facilities for waste disposal. Small multiuser drinking water facilities are also called cluster systems. Cluster systems may also mean small multiuser waste disposal facilities generally serving 12 or fewer users. Individual facilities generally mean that the drinking

water or waste disposal facility is serving one customer. Multiuser facilities generally mean that two or more customers are being served by one treatment unit.

3. WATER AND WASTEWATER TREATMENT FACILITIES

Mankind recognized the importance of water at a very early stage in the development of civilization. Families and settlements had to live near a potable water supply in order to survive. As the settlements grew, many times the demand for potable water caused the construction of reservoirs and transport systems at a high cost in human and material resources. These early civilizations also learned very quickly that when they stopped living as nomads and settled in a permanent location that disposal of the waste products was essential. We see evidence of both transport systems bringing water into the settlement and systems removing the wastewater. Although these early structures are thousands of years old, we still marvel at these accomplishments.

Adequate supplies of water are also essential for growth of food, recreation, transportation and commerce. Unfortunately, water is not distributed uniformly throughout the earth's populated areas nor is all of the water of a quality suitable for the needs of people and industry. Those areas with adequate, suitable water supplies are more likely to experience a higher standard of living through better health, more employment opportunities and water recreation. We need look no further

than this country's large cities and their relationship to a river, lake or ocean to realize our dependence on water.

The first attempts at developing improved water supplies and treatment were no doubt undertaken by individuals. Then individuals began banding together to solve common problems in order to take advantage of any economy of scale in obtaining technical advice, constructing the facility and providing continued operation.

Over the years, the water and wastewater industry has developed about two nuclei. The first group has developed around the central utilities. This group is made up of consulting engineers, large equipment manufacturers, chemical suppliers, construction contractors, municipalities and non-profit standard setting organizations. The second is the onsite or individual system segment made up of well drilling contractors, local plumbing suppliers, septic tank installers and point-of-use equipment manufacturers. The second group, although less seen and talked about in the arenas of Federal funding and university curricula, efficiently meets a serious need in small communities and rural areas. Because of the significant difference in the methods by which the two groups conduct their business, there has been little technical interchange and few central projects proposed using point-of-use technology.

Water

Point-of-use water supply and treatment systems can be of many different configurations. An acceptable system has both an adequate quantity and suitable quality of water. First, a source of water that will produce sufficient quantity must be located. This source could be a groundwater well, an intake from a surface stream, lake or manmade entrapment, or a central system. The technology exists to develop a supply of water at all but the most water deficient locations. If a number of sources are available, the selection should be based on the cost of development, quality of water obtained and the dependability of the source.

In some cases, the quality of the water is suitable without treatment. Such a system would require only miscellaneous piping, simple controls, pump and hydropneumatic tank to pressurize and meet the peak demands on the system. Water, being a good solvent, normally carries an assortment of minerals and chemicals that have dissolved in the water during transit over the ground surface or through the underlaying strata. In many cases these elements make the water objectionable, if for no other reason than taste, odor and color. These characteristics of the water can be modified with readily available devices that are installed on an individual faucet outlet, in-line prior to faucet(s), on a bypass to a separate faucet for drinking purposes, or prior to any use within the household. Point-of-use technology is also available to treat more serious water quality problems. Table 1 presents the generally accepted treatment techniques used when certain contaminants are known to exist in the water supply. Disinfection

of the water may be necessary under any of the treatment techniques mentioned if biological contaminants are found in the water or where point-of-use units promote bacterial growth. Disinfection of water can be accomplished usually at a reasonable cost by using a number of materials and methods, such as adding a form of chlorine, iodine, ozone or exposing the water to ultraviolet light. EPA is now considering mandatory filtration of surface water and disinfection of ground water. Each addition to the system necessary to obtain a suitable water quality increases the initial cost of the system and subsequent operating costs, the complexity of the system controls and the level of expertise needed to manage the system. An individual can obtain additional assistance to operate such a system through a service contract with a supplier or local contractor.

Point-of-use treatment can also be used in conjunction with or in addition to central treatment provided by a water utility. For whatever reason the central utility does not provide water of a quality acceptable to the individual user, additional treatment can be provided at the point-of-use, by devices described in Table 3-1. This practice is not uncommon in the treatment of water for industrial processes, for persons with special health problems or for esthetic reasons. FmHA financed point-of-use water treatment systems are described in Chapter 4.

Wastewater

As water is used within a household, domestic, commercial or industrial function impurities are added that if discharged directly to the environment would, in many cases, threaten the supply of water for this user or another. In and around municipalities the used water (wastewater) is normally discharged to a central wastewater collection system for transport to a treatment site and eventual discharge onto the land, into the ground or into the surface water.

Where the wastewater generator does not have access to a central system, provisions must be made to treat and dispose of the wastewater on or near the site. These onsite or individual wastewater treatment and disposal systems, like the water treatment systems, may be of many different configurations. The most common system used for onsite treatment and disposal is the septic tank and soil absorption field. Treatment may also be obtained by installing an aerobic treatment unit (basically a scaled down version of a central treatment plant process), a lagoon, intermittent sand filters, disinfection, waste segregation and recycle systems or a combination of these techniques.

Whereas, the choice of the system used to treat the wastewater onsite is mostly dependent on the characteristics of the wastewater, it must be coordinated closely with the choice of disposal method which is totally dependent upon the site characteristics. Disposal techniques fall into the major categories of subsurface soil disposal, evaporation and surface

water outfall. Lack of such environmental conditions as soils suitable for wastewater disposal, climatic conditions favorable for evaporation, or a surface stream capable of receiving a waste discharge can limit the alternatives to be considered on a specific site.

Over the last 10 years those working in the wastewater industry have come to realize that the cost of installing conventional collection and treatment systems when the onsite systems failed was prohibitively expensive in some cases. In order to solve a real problem, solutions have been developed that employ a combination of partial onsite treatment and central collection and treatment. Examples include the septic tank effluent pumping (STEP) and the small diameter gravity collection systems. In both examples the septic tank is installed on the site where the wastewater is generated to provide pretreatment prior to collection. This onsite pretreatment allows the installation of smaller collection lines, reduces the need for expensive manholes, and reduces the organic loading on the central treatment plant. Farmers Home Administration has been working closely with EPA, other agencies and consultants in the development of systems utilizing onsite alternatives.

TABLE 3-1. POINT-OF-USE WATER TREATMENT TECHNIQUES[1]

Treatment Type	NIPDWR[5] Contaminants	Other Contaminants
Reverse Osmosis[2]	Arsenic[3], Barium, Cadmium, Chromium, Lead, Mercury, Silver, Fluoride, Nitrate, Selenium, Radium, Some organics, herbicides, and pesticides	Total dissolved solids, Copper, Chloride, Sulfate foaming agents, corrosion
Cation Exchange	Barium, Cadmium, Chromium III, Lead Mercury	Copper, Zinc, Iron[4] Manganese[4]
Anion Exchange	Nitrate, Selenium VI, Arsenic III, Arsenic V, Chromium VI, Radium	Chloride, corrosion, Sulfate

Activated Alumina	Fluoride, Arsenic, Selenium IV	-
Direct (Mechanical) Filtration	Turbidity	Cysts
Activated Carbon	Organics, Organic Mercury	Color, foaming agents, taste, and odor
Distillation	Metals, high molecular weight organics	Total dissolved solids, Chloride, Sulfate

[1] Taken from the "Statement of the Water Quality Association to the EPA," December 13, 1983.

[2] Results of reverse osmosis treatment may vary between pressurized and non-pressurized units, membrane type, and configuration.

[3] Arsenic (+3) is poorly removed with reverse osmosis.

[4] Low levels.

[5] National Interim Primary Drinking Water Regulation.

The following figures which show planning considerations and typical configurations for using point-of-use and onsite technology have been placed at the end of this chapter.

Figure 3-1 - Individual Well and Pumphouse; Manual of Individual Water Supply Systems, EPA Publication 570/9-82-004.

Figure 3-2 - Pond and Intake Facilities; ibid.

Figure 3-3 - Non-backwashed Carbon Filter Installation with Reservoir Tank; Campbell, Michael D. and Lehr, Jay H.; Rural Water Systems Planning and Engineering Guide, Commission on Rural Water, 1973.

Figure 3-4 - Chlorinator Installation; ibid.

Figure 3-5 - Typical UV Disinfection Unit; Onsite Wastewater Treatment and Disposal Systems; EPA Design Manual 625/1-80-012, October 1980.

Figure 3-6 - Wastewater Management Options in Unsewered Areas; Otis, Richard J., "Site Evaluation of Onsite Treatment and Disposal Systems;" EPA Design Workshop, March 1982.

Figure 3-7 - Feasibility of Different Disposal Methods Under Various Site Constraints; ibid.

Figure 3-8 - Typical Recirculating Intermittent Filter System; ibid 3-5.

Figure 3-9 - Recirculation Tank; ibid.

Figure 3-10 - Examples of Extended Aeration Package Plant Configurations; ibid.

Figure 3-11 - Examples of Fixed Film Package Plant Configurations; ibid.

Figure 3-12 - Typical Evaporative/Infiltration Lagoon for Small Installations; ibid.

Figure 3-13 - Annual Evaporation Rates in Inches, ibid.

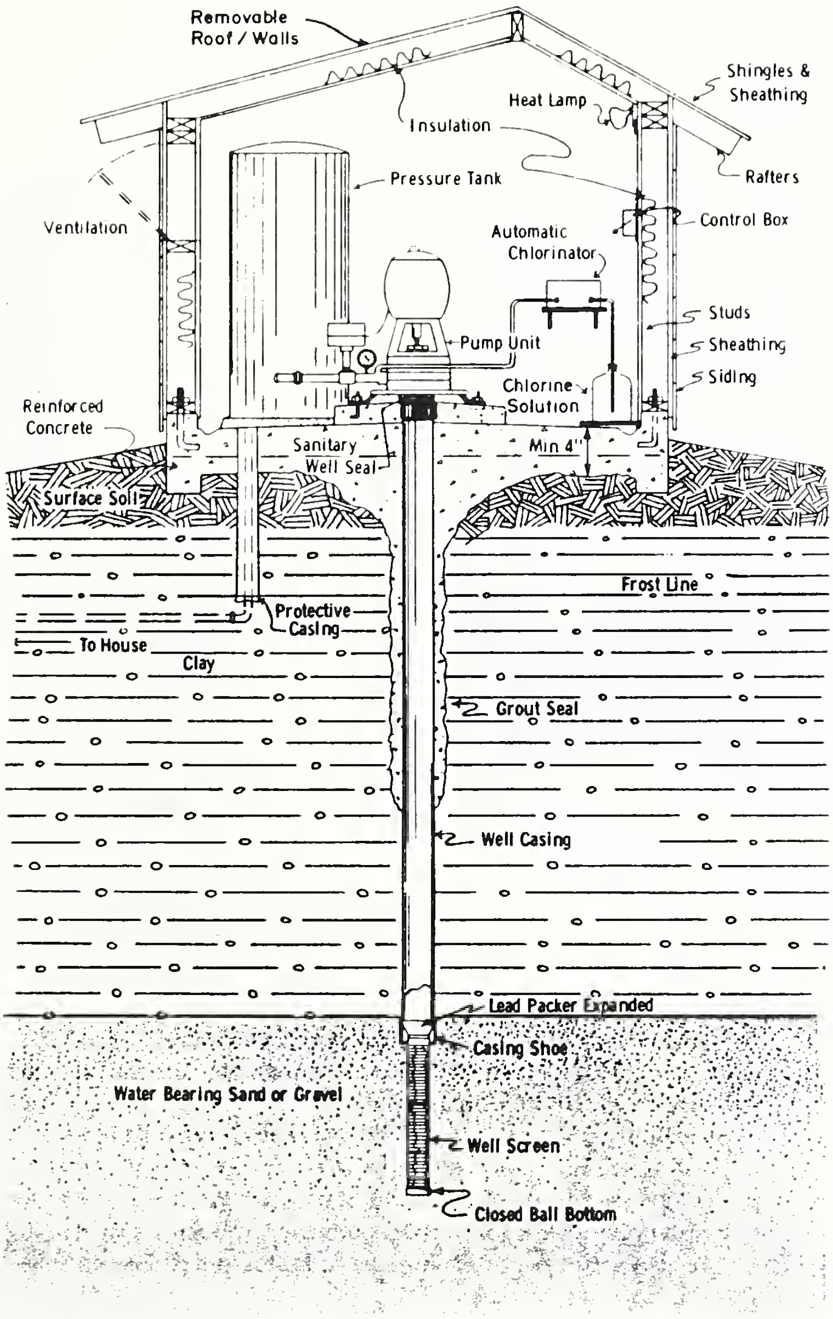
Figure 3-14 - Typical Grinder Pump Installation; Kressel, James F., Status of Pressure Sewer Technology," prepared for EPA.

Figure 3-15 - Typical Septic Tank Effluent Pump; ibid.

Figure 3-16 - Schematic of Small Diameter Gravity System; Otis, Richard J., "Wastewater Collection Systems, Small Diameter Gravity Sewers," EPA Design Workshop, March 1982.

Figure 3-1

Individual Well and Pumphouse



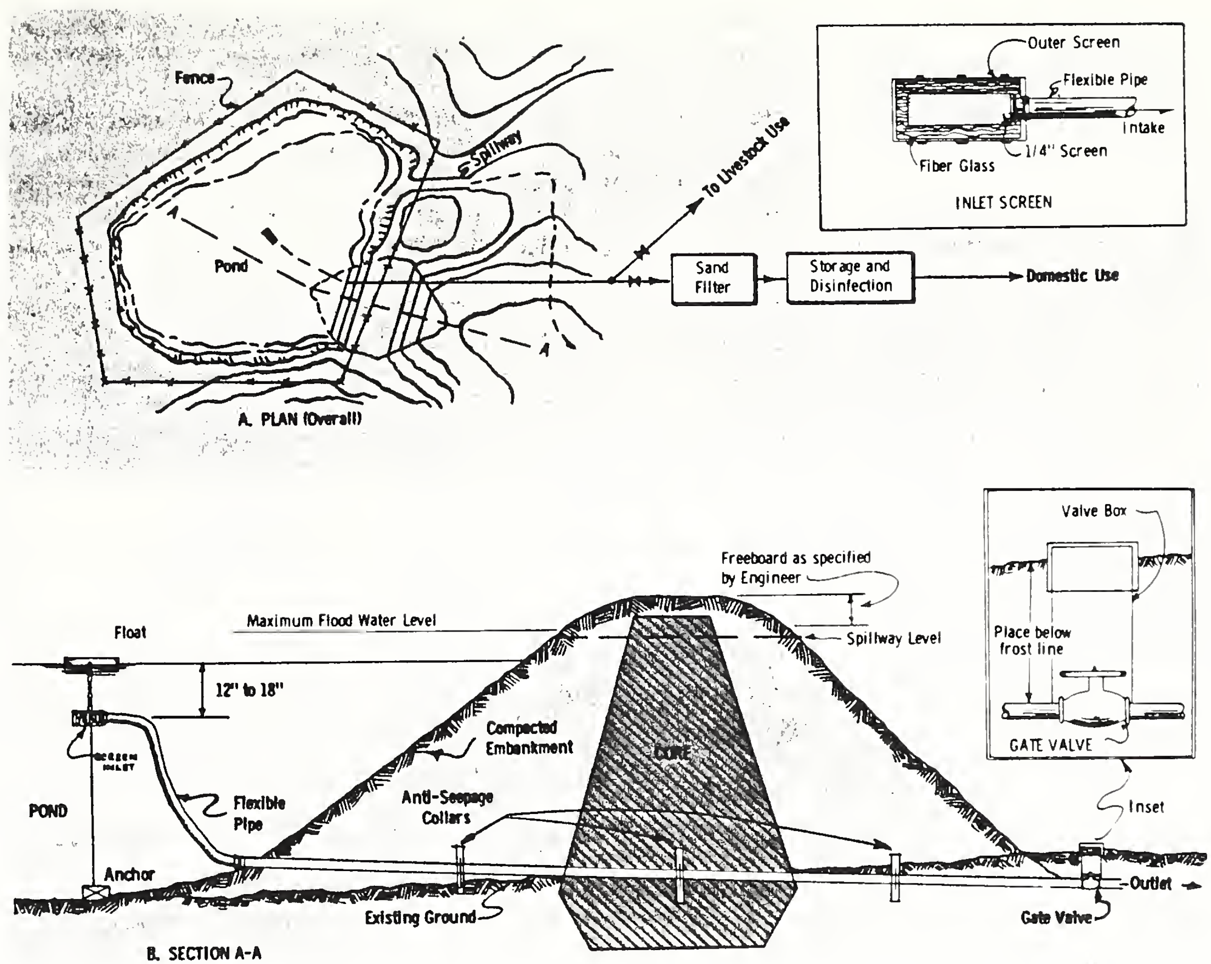


Figure 3-2

Pond and Intake Facilities

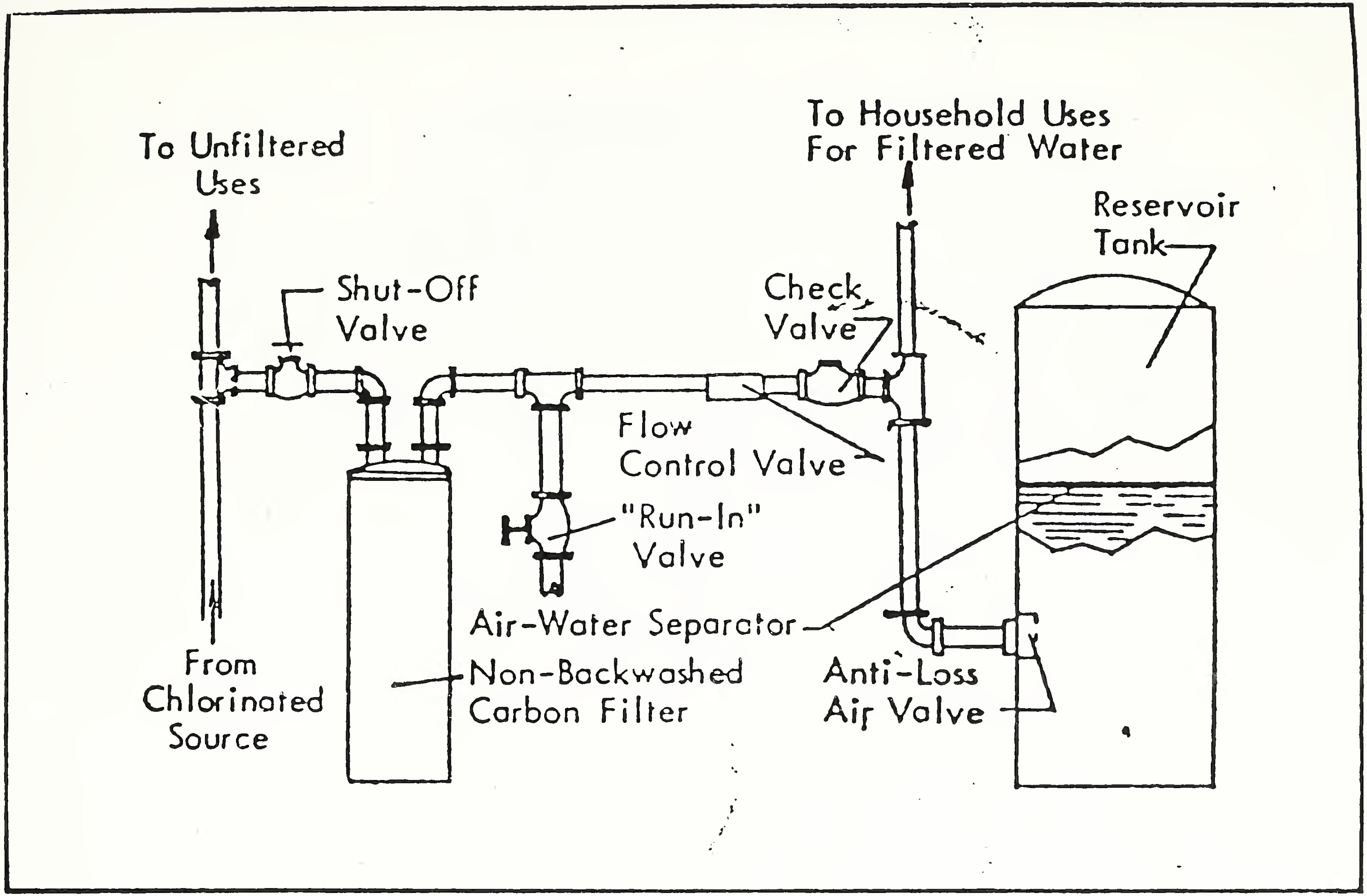


Figure 3-3

Non-backwashed Carbon Filter Installation with Reservoir Tank

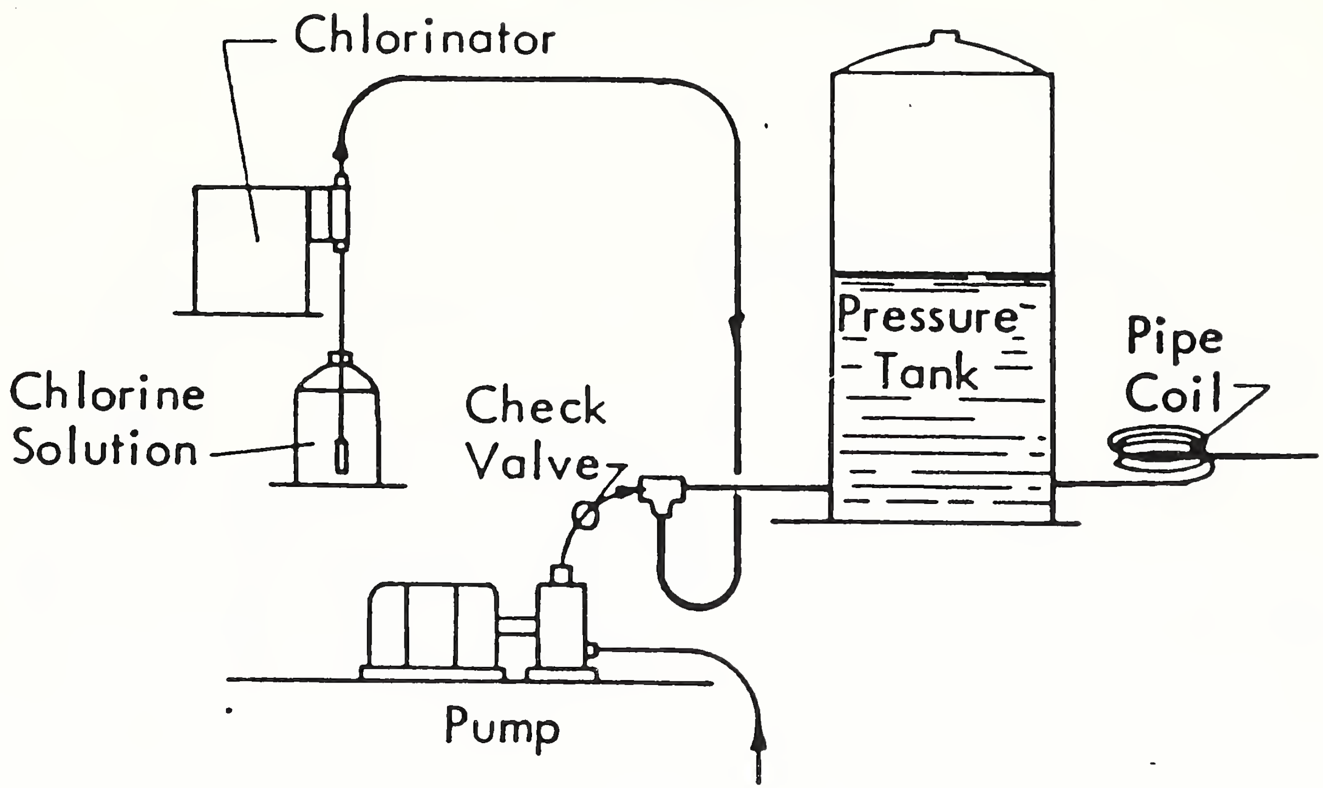


Figure 3-4

Chlorinator Installation

TYPICAL UV DISINFECTION UNIT

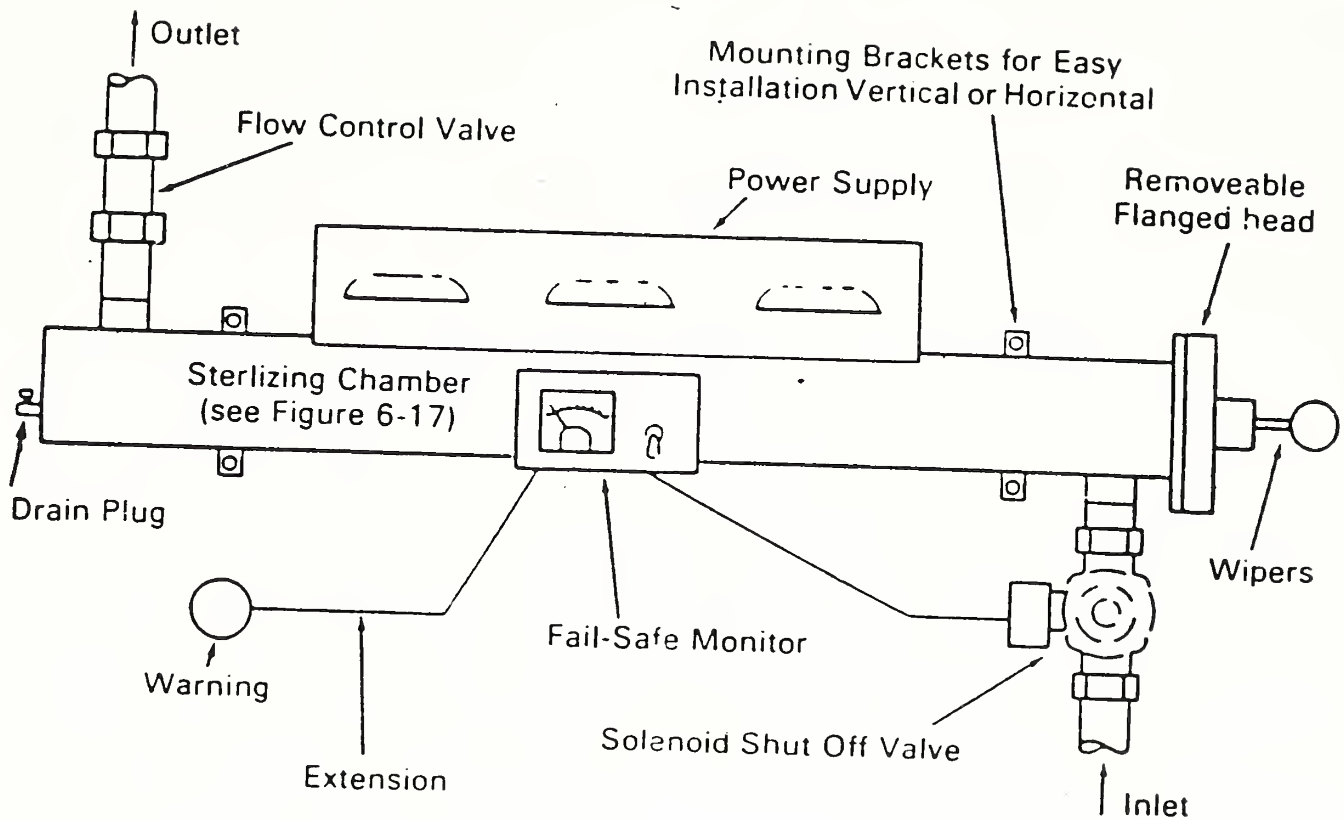
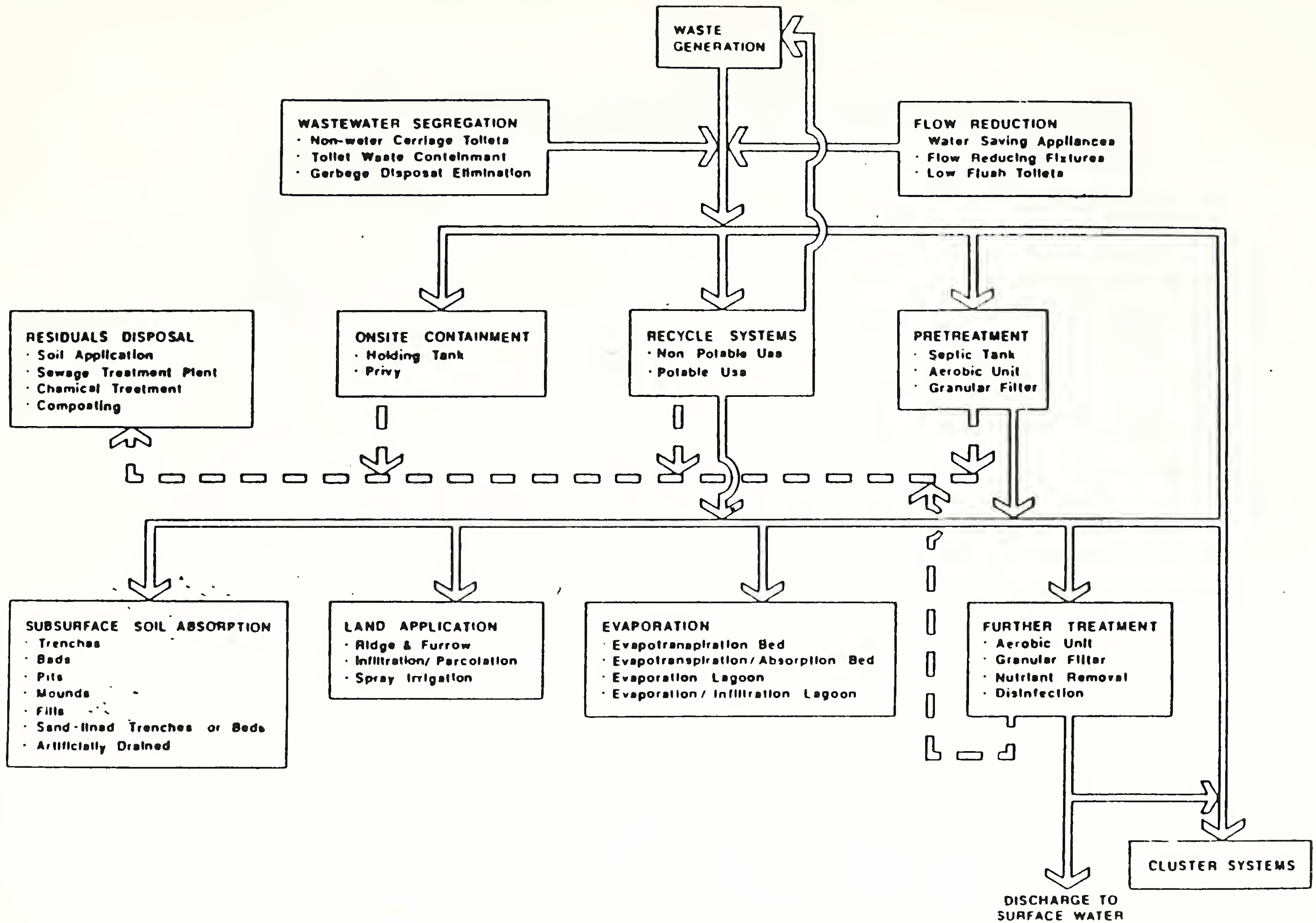


Figure 3-5

Typical UV Disinfection Unit



Wastewater Management Options in Unsewered Areas
Figure 3-6

Method	Site Constraints: Soil Permeability			Depth to Bedrock			Depth to Water table		Slope			Small Lot Size
	Very Rapid	Rapid-Moderate	Slow-Very Slow	Shallow and Porous	Shallow and Nonporous	Deep	Shallow	Deep	0-5%	5-15%	15%	
Trenches		X	X[2]			X		X	X	X	X	X[1]
Beds		X				X		X	X			X
Pits		X[3]				X		X	X	X	X	X
Mounds	X	X	X	X	X	X	X	X	X	X		
Fill Systems	X	X[1]	X[1]	X	X	X	X	X	X	X	X	X[1]
Sand Lined Trenches or Beds	X	X	X			X		X	X	X[1]	X[1]	X[1]
Artificially Drained Systems		X				X	X		X	X	X[1]	
Evaporation Infiltration Lagoons		X	X[4]			X[4]		X	X			
Evaporation Lagoons (lined)[4,5]	X	X	X	X	X	X	X	X	X			
ET Beds or Trenches (lined)[4,5]	X	X	X	X	X	X	X	X	X	X[6]		
ETA Beds or Trenches[4]		X	X			X		X	X	X	X	X

[1] Only where surface soil can be stripped to expose sand or sandy loam material

[2] Construct only during dry soil conditions. Use trench configuration only

[3] Trenches only

[4] Flow reduction suggested

[5] High Evaporation potential required

[6] Recommended for south facing slopes only

X means system can function effectively with that constraint

Figure 3-7

TYPICAL RECIRCULATING INTERMITTENT FILTER SYSTEM

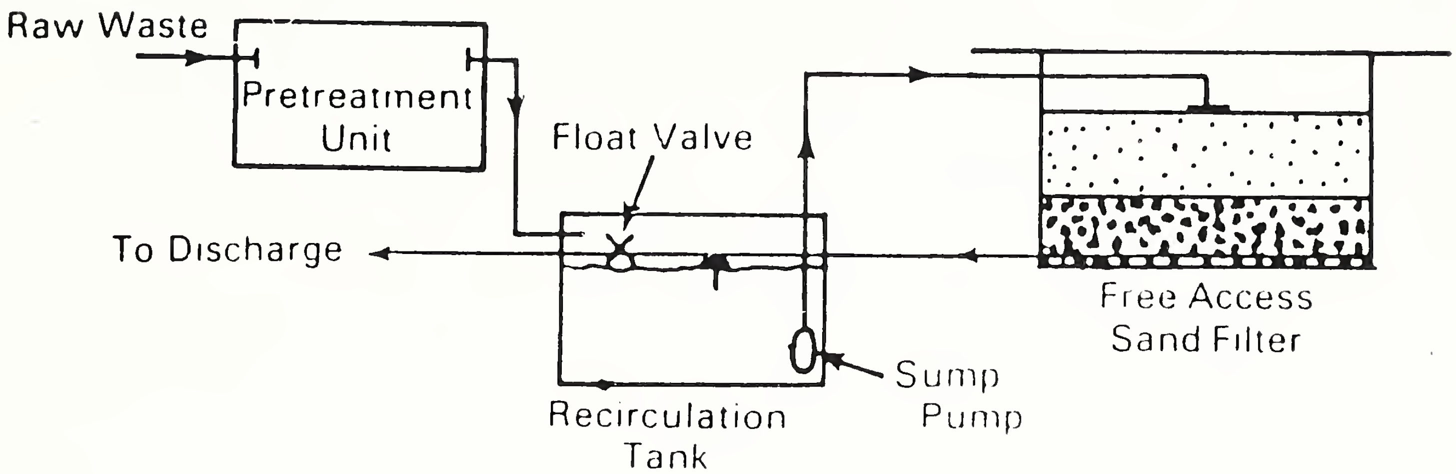


Figure 3-8

RECIRCULATION TANK

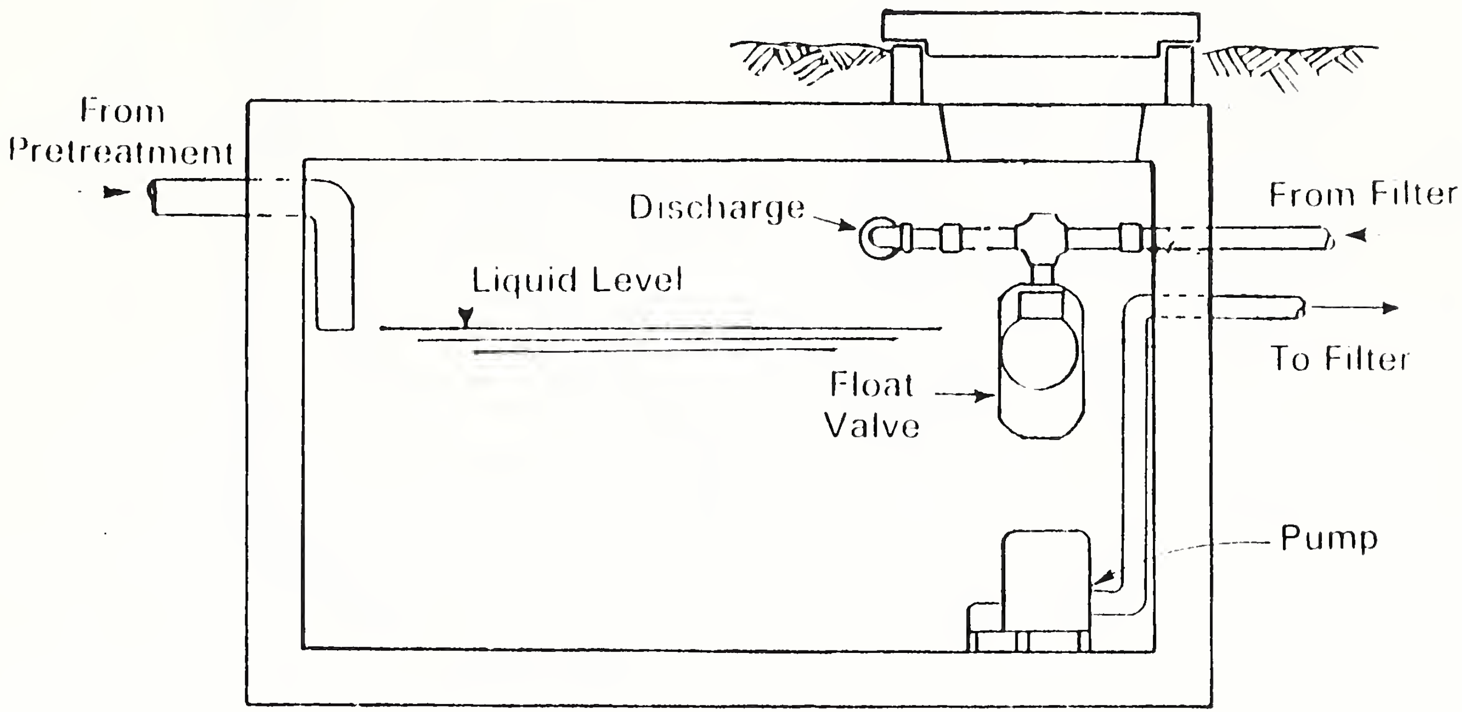
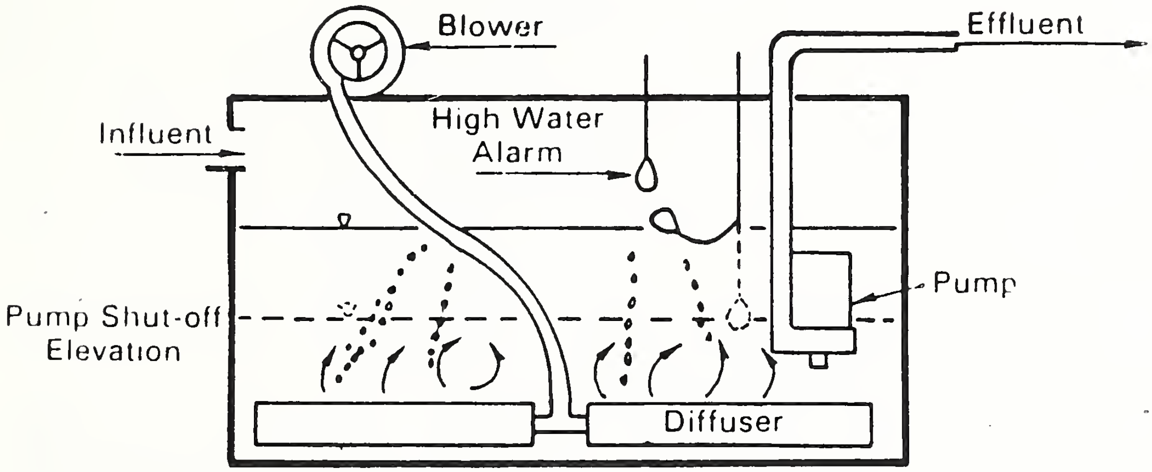


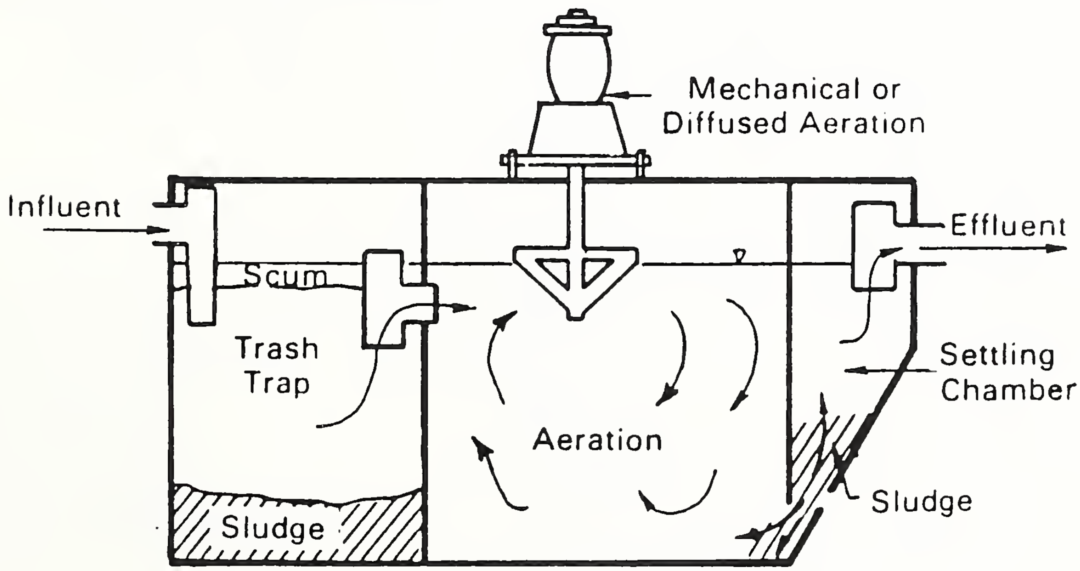
Figure 3-9

Figure 3-10

EXAMPLES OF EXTENDED AERATION PACKAGE PLANT CONFIGURATIONS

Batch - Extended Aeration





Flow-Through Extended Aeration

Figure 3-11

EXAMPLES OF FIXED FILM PACKAGE PLANT CONFIGURATIONS

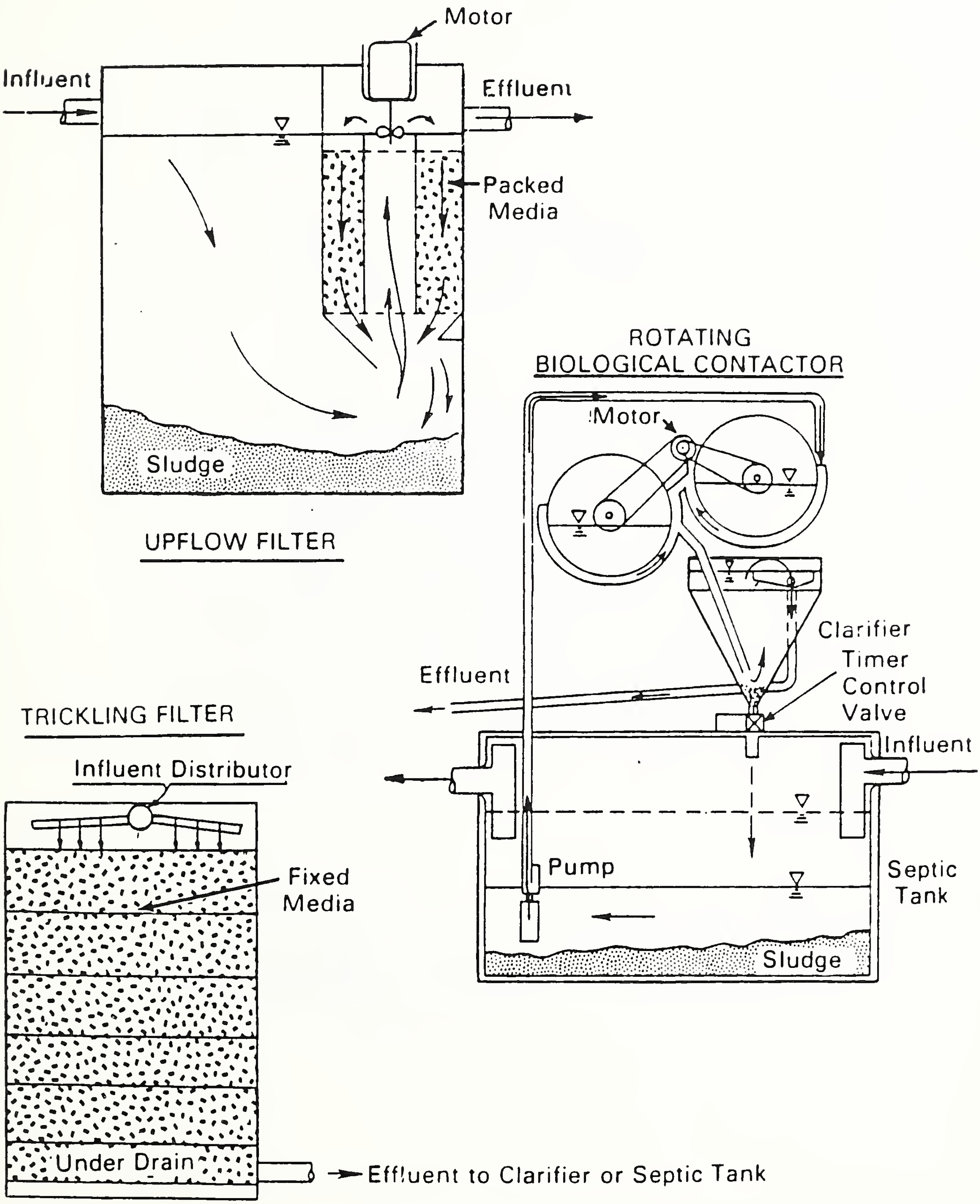
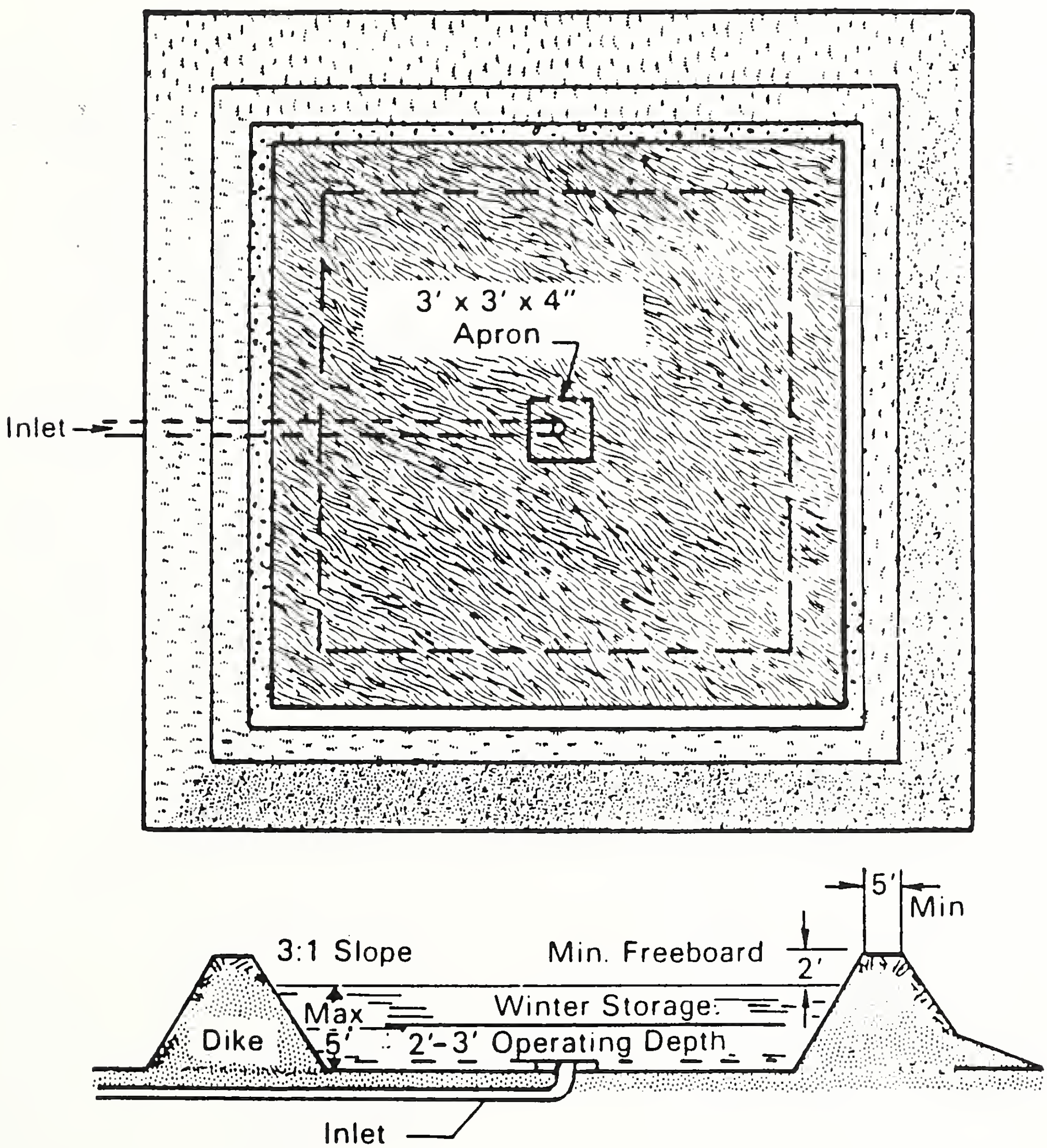


Figure 3-12

TYPICAL EVAPORATION/INFILTRATION LAGOON FOR SMALL INSTALLATIONS



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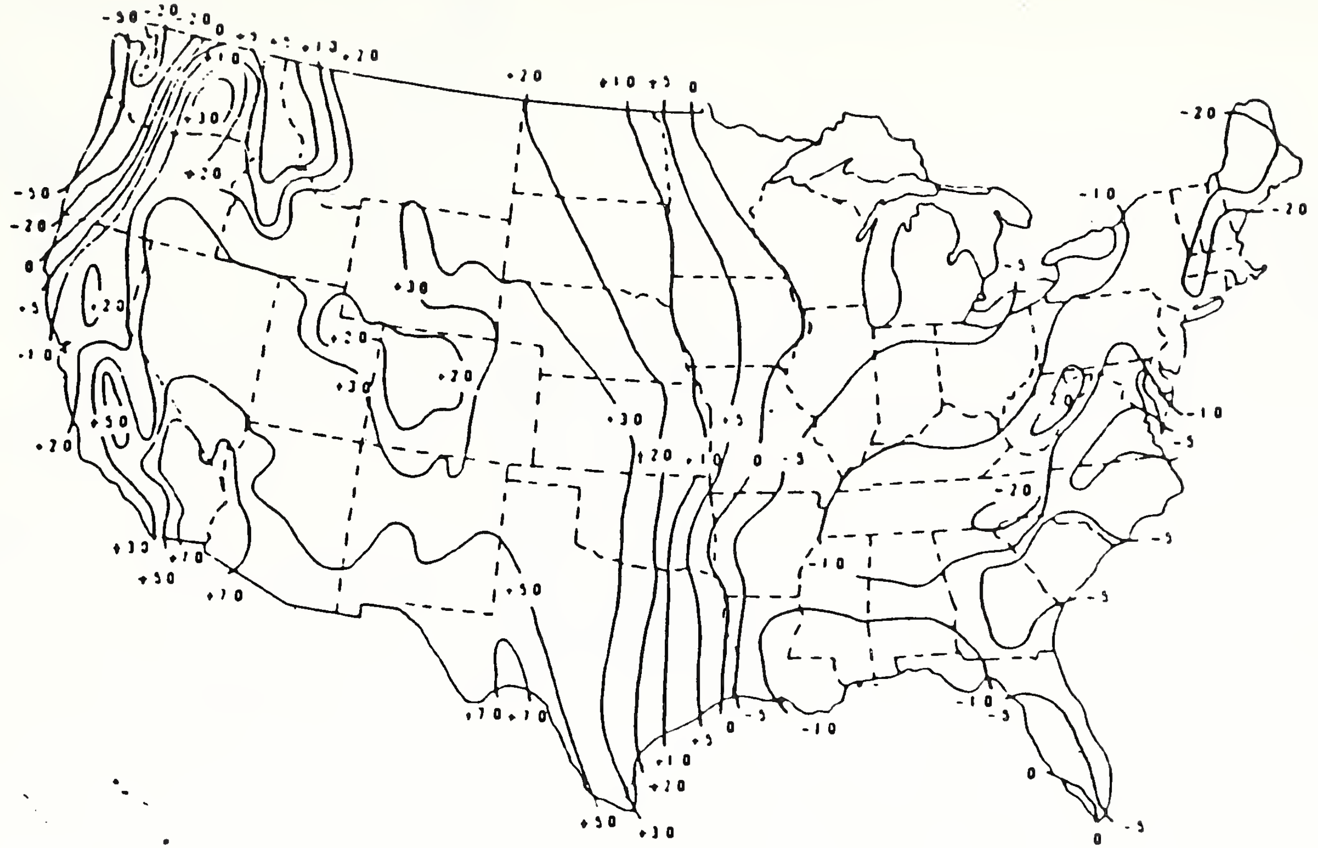
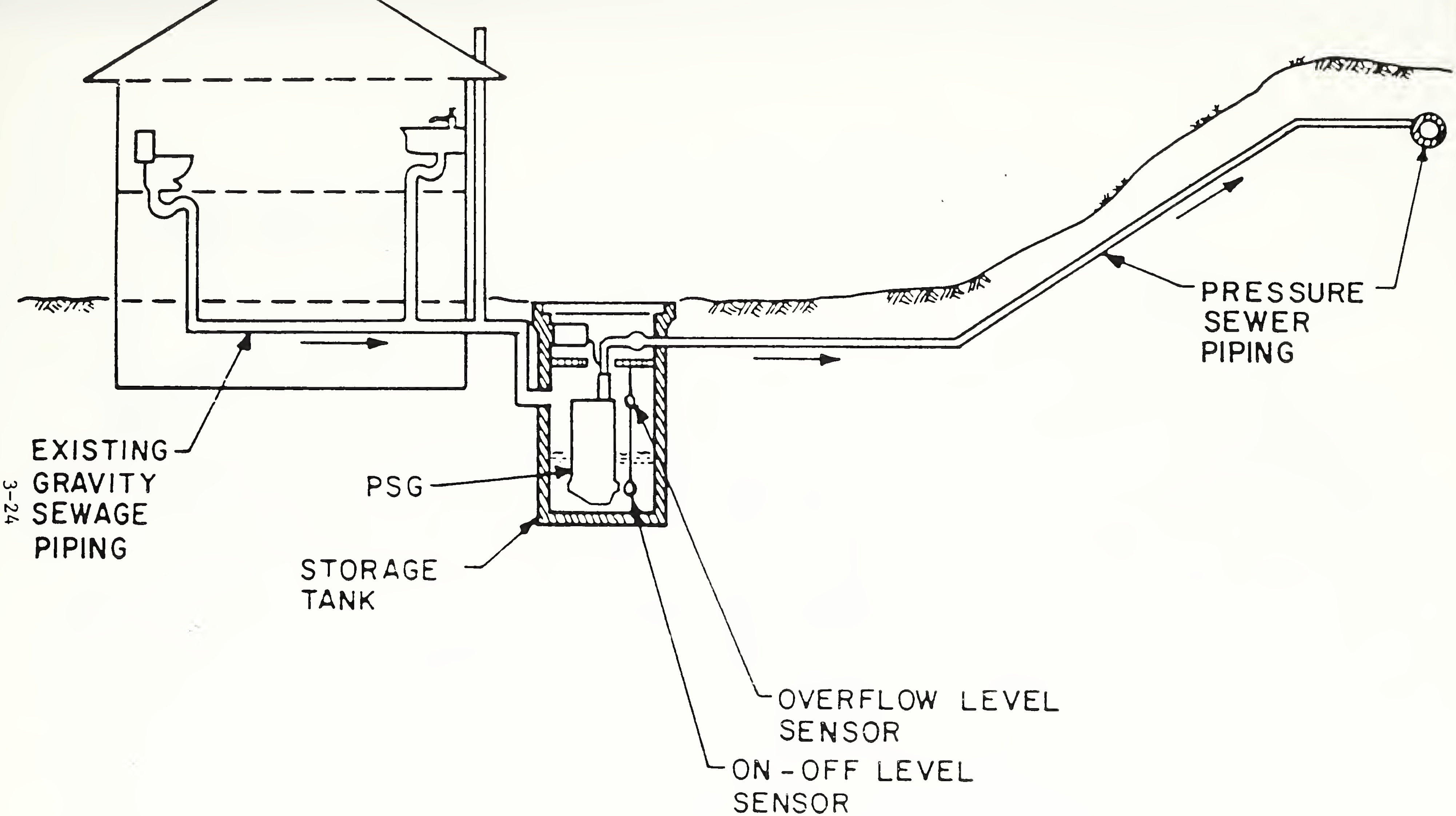


+ Potential Evapotranspiration more than mean annual precipitation

– Potential Evapotranspiration less than mean annual precipitation

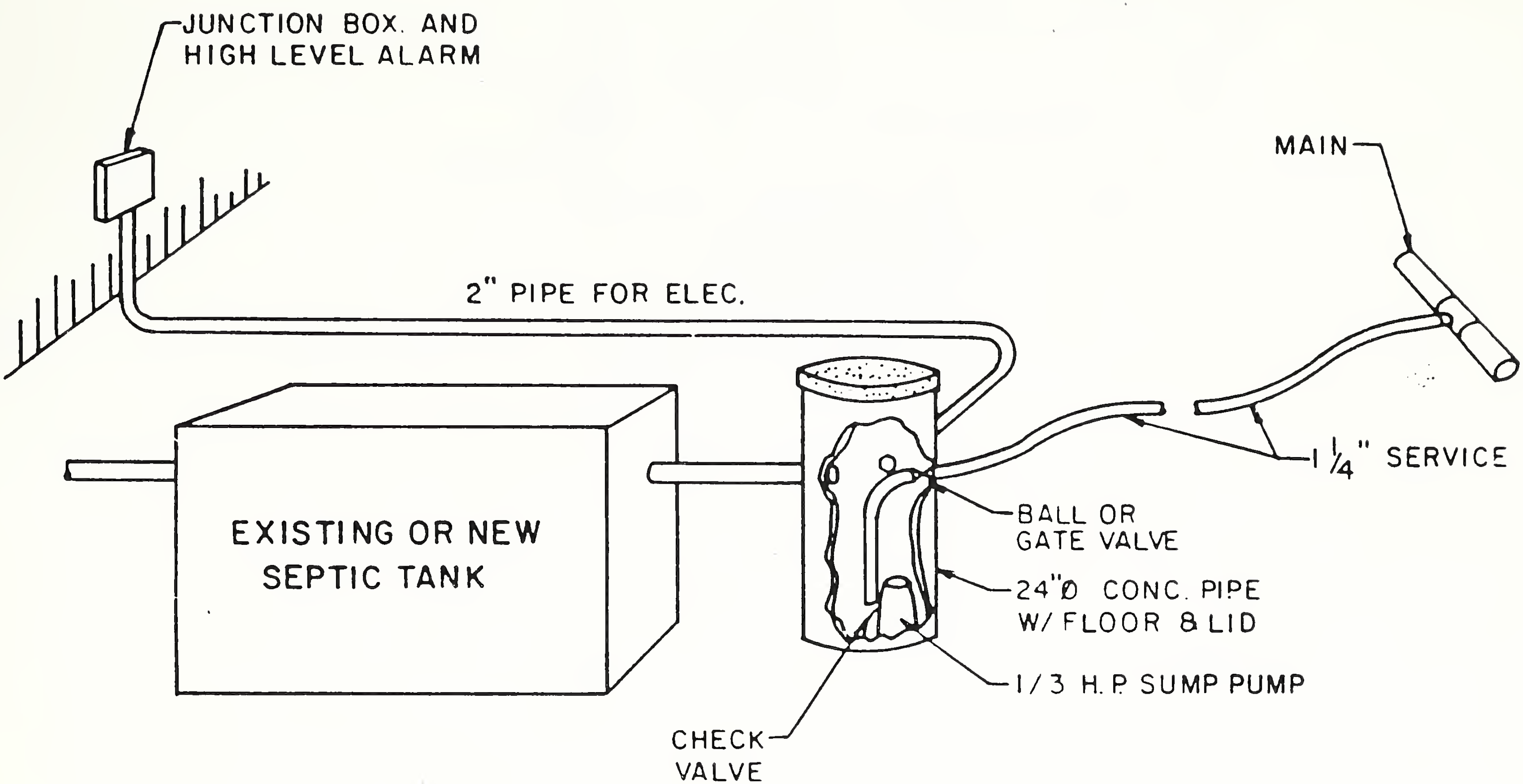
Net Annual Evaporation Rates in Inches in the Continental United States (U.S. EPA, 1980)

Figure 3-13



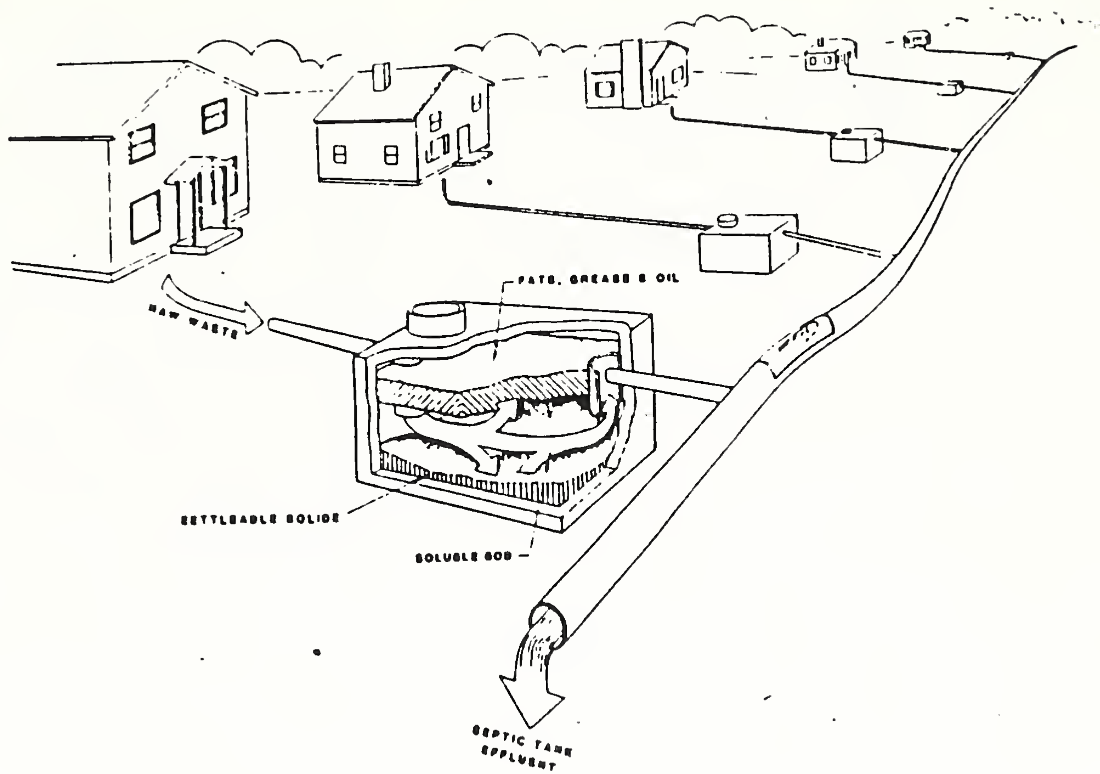
Typical Grinder Pump Installation

Figure 3-14



Typical Septic Tank Effluent Pump

Figure 3-15



Schematic of Small Diameter Gravity System

Figure 3-16

4. FMHA COMMUNITY PROGRAMS

Statutory

The Water Facilities Act, passed in 1937, provides for loans to individual and association farm water systems in 17 Western States where drought and water shortages were familiar hardships. The act was amended in 1954 to provide for such assistance nationwide and also to take on nonfarm customers in rural communities.

A major overhaul and expansion of authorities occurred in 1961 with the passage of the Consolidated Farmers Home Administration Act of 1961. One of the principal provisions opened the water system program to the general rural population, including incorporated towns up to 2,500 people. Authorities were further expanded in 1965 when the loan program was transformed into a loan and grant program for both water and waste disposal systems. The Rural Development Act of 1972 amended the Consolidated Farmers Home Administration Act which then became the Consolidated Farm and Rural Development Act (CONACT).

Under Section 306 of the CONACT (7 U.S.C. 1926), the Secretary is authorized to make or insure loans to associations, including corporations

not operated for profit, Indian tribes on Federal and State reservations and other federally recognized Indian tribes, and public and quasi-public agencies to provide for the application or establishment of soil conservation practices, shifts in land use, the conservation, development, use, and control of water, and the installation or improvement of drainage or waste disposal facilities, recreational developments, and essential community facilities including necessary related equipment, all primarily serving farmers, ranchers, farm tenants, farm laborers, and other rural residents, and to furnish financial assistance or other aid in planning projects for such purposes.

The Secretary is further authorized to make grants to such associations to finance specific projects for works for the development, storage, treatment, purification, or distribution of water or the collection, treatment, or disposal of waste in rural areas. The amount of any grant made under the authority of this paragraph shall not exceed 75 percent of the development cost of the project to serve the area which the association determines can be feasibly served by the facility and to adequately serve the reasonably foreseeable growth needs of the area.

No grant shall be made under this authority (Section 306 (a)(2)) in connection with any project unless the Secretary determines that the three conditions are met. First, the project will serve a rural area which, if such project is carried out, is not likely to decline in population below that for which the project was designed. Second, the project is designed and constructed so that adequate capacity will or can be made available to

serve the present population of the area to the extent feasible and to serve the reasonably foreseeable growth needs of the area. Third, the project is necessary for an orderly community development consistent with a comprehensive community water, waste disposal, or other development plan of the rural area and not inconsistent with any planned development provided in any State, multijurisdictional, county, or municipal plan approved by competent authority for the area in which the rural community is located. Furthermore, the Secretary shall require the submission of all applications for financial assistance under this section to the multijurisdictional substate areawide general purpose planning and development agency that has been officially designated as a clearing-house agency under Office of Management and Budget Circular A-95 (A-95 has been replaced by Executive Order 12372; however, the language in the legislation still refers to A-95) and to the county or municipal government having jurisdiction over the area in which the proposed project is to be located for review and comment within a designated period of time not to exceed 30 days concerning, among other considerations, the effect of the project upon the areawide goals and plans of such agency or government. No loan under this section shall be made that is inconsistent with any multijurisdictional planning and development district areawide plan of such agency. The Secretary is authorized to reimburse such agency or government for the cost of making the required review.

Regulatory

FmHA Instructions 1942-A and 1942-H (7 CFR 1942); Community Facility Loans and Development Grants for Community Domestic Water and Waste Disposal Systems have been developed for administering this authority. The major components of these regulations are described below.

1. General. The Farmers Home Administration (FmHA) is authorized to provide financial assistance to develop water and waste disposal facilities for public use in rural areas and towns up to 10,000 people. Any community eligible for credit from commercial or cooperative sources or that can finance a project from its own resources is not eligible for such assistance from FmHA.

2. Who May Receive Loans. Loans are available for public entities such as municipalities, counties, and special purpose districts and Indian tribes. Nonprofit corporations may also receive loan assistance when adequate plans for loan repayments are made.

3. Use of Funds. Funds may be used to construct, enlarge, extend, and improve water, sewer, solid waste, and storm sewer facilities. In the case of a water system, funds may be used to develop a source of water and to construct transmission and distribution lines. Funds may be used for the collection and treatment portions of a sewer system. FmHA funds may be used in conjunction with funds from the

private sector or other Federal, State, or local funds in financing such facilities.

Listed below are the funds obligated and number of loans and grants made during Fiscal Years 1980 to 1985.

	LOANS		GRANTS	
Fiscal Year	Number	Amount ($)	Number	Amount ($)
1980	1825	700 Million	1011	298.7 Million
1981	1768	750 " "	788	210.4 " "
1982	928	375 " "	444	133.8 " "
1983	1184	600 " "	630	313.2 " "
1984	645	270 " "	276	103.7 " "
1985	783	340 " "	366	128.9 " "

4. Grants. Grants may be available for up to 75 percent of project development costs. They will be made on projects that serve the most financially needy communities to reduce user costs to a reasonable level. Ordinarily, a grant will be considered only when the debt service portion of the cost to the eligible user for either water or waste disposal service exceeds (1) .5 percent when the median household income of the service area is under the poverty line, or (2) one percent when the median household income of the service area is above the poverty line but not more than 85 percent of the State's

nonmetropolitan household income. Grant funds are not available when the median household income of the service area exceeds 85 percent of the State's nonmetropolitan median household income.

5. Terms. The maximum term on all loans is 40 years. However, no repayment period will exceed any statutory limitation on the organization's borrowing authority or the useful life of the improvement or facility to be financed.

6. There are currently three different interest rates for FmHA water and waste disposal loans. These rates are reviewed quarterly. A brief description of the rates follow with the current rates for the quarter April 1 - June 30, 1986.

Poverty line rate -- A 5 percent rate is available when the loan is required to meet health or sanitary standards <u>and</u> the median household income (MHI) of the service area is below the poverty line or less than 80 percent of the nonmetropolitan median household income of the State.

Intermediate rate -- Loans that do not qualify for a 5 percent interest rate may be made at an interest rate halfway between 5 percent and the market rate, not to exceed 7 percent. It will apply to loans that do not meet the requirement for the poverty line rate and for which the median household income of the service area is below the poverty line or not more than 100 percent of the nonmetropolitan median household income of the State. Current rate: <u>6.125 percent.</u>

Market rate -- The market rate will apply for those applicants that do not qualify for 5 percent or intermediate rates. The market rate is established quarterly by FmHA based on current yields of comparable outstanding municipal obligations. Current rate: 7.125 percent.

Provisions for Individual Facilities

FmHA regulations address service through individual installations. They provide that community owned water or waste disposal systems may provide service through individual installations or small clusters of users within the applicant's service area. When individual installations or small clusters are proposed, the loan approval official should consider such items as: quantity and quality of the individual installations that may be developed; cost effectiveness of the individual facility compared with the initial and long-term user cost on a central system; health and pollution problems attributable to individual facilities; operational or management problems peculiar to individual installations; and permit and regulatory agency requirements. FmHA regulations also provide that:

1. Applicants providing service through individual facilities must meet the same eligibility requirements as for any applicant. Facilities must primarily serve rural residents which means rural areas and towns up to 10,000 people.

2. FmHA must approve the form of agreement between the owner and individual users for the installation, operation and payment for individual facilities.

3. If taxes or assessments are not pledged as security, owners providing service through individual facilities must obtain security as necessary to assure collection of any sum the individual user is obligated to pay the owner.

4. Notes representing indebtedness owed the owner by a user for an individual facility will be scheduled for payment over a period not to exceed the useful life of the individual facility or the FmHA loan, whichever is shorter. The interest rate will not exceed the interest rate charged the owner on the FmHA indebtedness.

5. Owners providing service through individual or cluster facilities must obtain easements for the installation and ingress to and egress from the facility; and an adequate method for denying service in the event of nonpayment of user fees.

As stated above, FmHA has authority to provide financing for point-of-use domestic water treatment and onsite wastewater treatment facilities. However, it should be clearly understood that such assistance will only be made available to eligible borrowers. Appropriate consideration must be given to overall effectiveness and feasibility of all proposals. All entities that receive financing from FmHA will maintain the responsibility

for operating, maintaining, managing and providing for the continued availability and use of that part of the facility on which FmHA provided financial assistance. Consequently, any agreements between the borrower and individual users must not adversely affect those activities or the Government's interest.

Examples Using Individual Facilities

Muskingum County, Ohio - Variable-grade, Small Diameter, Effluent Sewer

The system, now under construction, represents the first installation of this size using small diameter pipe (2") not laid to uniform grade to transport septic tank effluent by gravity to a central treatment site. The structures within the area being served were initially constructed with individual onsite septic and soil absorption fields. Due to the increase in density of development and the soil types within the area, many of the systems had failed according to health department criteria. Many options were evaluated. The most cost effective option was to continue to use the existing septic tank and then transport the effluent to central treatment. This approach allowed the use of smaller collection lines and less concern for maintaining scouring velocities within the pipe. Because the topography of the area allowed most of the septic effluent to drain by gravity, the system does not provide a pump at each connection as in most small diameter pressure systems. Of the 750 connections on the system, only 17 pump stations are being installed.

This reduces both the initial and maintenance costs. The main sewer pipe is buried at a shallower average depth thereby reducing the overall cost of installation. With the wastewater being partially treated in each of the individual septic tanks, lower maintenance of the collection system is expected and the treatment plant capacity can be reduced over that required using conventional systems.

Thunderbird Water Improvement District, Arizona

On October 10, 1980, FmHA made a $2,100,000 loan to Thunderbird Water Improvement District to provide satisfactory drinking water to rural residents. Prior to the project, the residents were connected to an irrigation water system which provided water high in fluoride. The loan was used to establish a separate potable water system and reduce fluoride levels to within acceptable limits. The design was conventional except that excessive fluorides were removed by installing filters at each service connection.

The system, serving about 300 users, is operated by a local board with only two part-time employees operating and maintaining the system. One employee works in the office during weekday mornings and the other provides service to the fluoride units, reads meters and makes repairs as necessary. System operators indicate that the fluoride units are working as designed and that testing always indicated that fluoride levels were within acceptable limits when units were serviced regularly.

Allensworth Community Services District, California

In 1967 FmHA approved project funds for what was then the Allensworth Mutual Water Company. These funds were for the development of a new central water system well and distribution system to eliminate individual shallow wells which contained arsenic in quantities in excess of State and Federal drinking water standards.

When the new deep well was placed into operation along with a central distribution system, despite the best engineering design and test well drilling techniques, the water contained arsenic exceeding State and Federal standards. FmHA, in the same year, with the recommendations from both County and State Health Department authorities, approved a subsequent loan and grant to purchase and install individual point-of-use reverse osmosis units in each water user's kitchen.

The units worked well for 12 months until a filter component needed to be replaced. The replacement cost of the internal cartridge unit was approximately $15 each. Allensworth is a low income community and most of the residents objected to the cost of purchasing replacement filters. Many users, therefore, did not install new cartridges. The Mutual Water Company was unable to force the individual users to make the replacement.

The State of California, in 1983, funded the development of another central system water well. By 1984, the new well was completed bringing the water into compliance with State and Federal drinking water

standards. The improvements eliminated the need for the point-of-use reverse osmosis units.

Based on our Allensworth experience, point-of-use devices are not a practical alternative to central systems unless the utility has sufficient authority to maintain the individual units.

Town of Kingfield, Maine

The 1984 project cost approximately $2.5 million for 220 users. The central village area is served by a collection system with treatment provided by a septic tank followed by absorption beds. The sections of town outside the densely built-up village core are served by individual septic tanks and subsurface disposal facilities or by small multiuser cluster systems serving 2 to 5 buildings. In the preliminary economic evaluation, the estimated present worth of 3 alternative systems were essentially equal. The central system with rapid infiltration was about 2% higher than the conventional system while the individual cluster system was about 2.5% higher than the conventional system. When considering the impact of EPA grant funds, the individual cluster system resulted in a considerably lower total annual revenue requirement. This held true even when considering the additional cost of internal plumbing at several of the individual houses.

Levy Limehouse Bellinger Hill Water Company, South Carolina

In the mid-1970's, FmHA financed the Levy Limehouse Bellinger Hill Water Company system which consists of 38 wells now serving approximately 275 rural residents in sparsely settled areas of lower Jasper county. The houses are clustered around one or more small yield wells connected by up to 3-inch water lines to which service lines and individual meters are attached.

5. FMHA ASSISTANCE ISSUES

FmHA Regulations

Clearly FmHA regulations permit the funding of projects providing service through individual point-of-use or onsite installations or small clusters of users within the service area. However, in reviewing a proposal for these projects, consideration is given to such items as quality and quantity of the individual installations; cost effectiveness of the individual facility compared with the initial and long-term user cost on a central facility; health and pollution issues associated with individual facilities; operational or management issues peculiar to non-central systems; and permit and regulatory agency requirements.

Other issues noted in FmHA regulations pertaining specifically to individual installations are: eligibility, user agreements, security, useful life, interest rate, access and termination of service. Applicants must meet the eligibility requirements. The type of eligible applicants are (1) public bodies, (2) non-profit associations and, (3) Indian tribes. The form of agreement between the owner and the users must be approved by FmHA and should address topics such as installation, operation

and payment. The security pledged for the loan must be sufficient to assure collection of any sum the individual user is obligated to pay the owner and notes representing indebtedness of the user owed to the owner must be scheduled for payment over a period not to exceed the useful life of the individual facility or the FmHA loan term, whichever is less. The interest rate must not exceed the rate of the FmHA indebtedness. Access to individual facilities must be assured by easements and there must be a method for denying service if the user does not pay.

Issues

The methodology used in addressing the issues should be based on several axioms recognized by the Environmental Protection Agency which provide a starting point for FmHA's evaluation.

- All proposed facilities and management plans must meet water quality and public health objectives;

- Land use controls should be considered as an integral part of the planning process, since individual facilities could potentially provide attractive alternatives to central system options, particularly for new development;

- All water and wastewater facilities, whether on or offsite, must be properly managed;

- Public acceptance of the recommended plan is essential for implementation;

- All facilities must provide an acceptable level of service to the users even though the method may vary.

From the outset of the project the applicant must fully understand that it has the final responsibility for a system's performance. FmHA may provide guidance and assistance in addressing the issues and developing mutually agreeable, options but the facility will belong to the applicant and it will be the applicant's responsibility to assure proper operation. The characteristics of small communities add another facet which must be considered. Issues and options must be viewed in the context of small community characteristics such as size and growth potential; tax base limitations; homogeneity (e.g. resort areas, bedroom communities, retired population); limited number of people with technical knowledge; and limitation of management skills. Suggestions made in this document recognize these characteristics, and stress the critical need to have the community, their consultants and FmHA work effectively together to develop solutions. The importance of this partnership cannot be overstated.

The feasibility and practicality of solving water and wastewater problems with point-of-use and onsite installations presents several issues which will be discussed under the headings of organization and cost allocation, planning and design, construction, and operation.

Organization and cost allocation

FmHA regulations clearly describe the eligibility requirements of an applicant; however, the institutional aspects remain to be defined. In centralized systems the facilities are owned and managed by the organization. Using onsite and point-of-use designs provide for cost sharing arrangements and different types of service. The system can be privately owned and managed under a permit system, privately owned and publicly managed, or publicly owned and managed. In the first method, the individual user must comply with regulations and pays all maintenance costs. In the second option, the individual user pays user charges to the organization, which performs a range of maintenance services. In the third arrangement, the organization owns the individual systems and provides service to all users for a user fee. All construction, operation, and maintenance tasks are performed by the organization, or firms under contract with the organization.

Cost for the various options may be affected by the organizational arrangement, and the distribution of cost depends greatly on the financing methods chosen. The choice of a particular financing arrangement depends on whether the community as a whole wishes to share the costs of program administration, operation and debt service equally among all users or whether individual users are to pay according to the actual service rendered to their individual systems. The first approach equalizes the cost of system replacement and operation among all users over the life of the loan. The second method imposes cost on almost a house-by-house

basis, recognizing the different operation and maintenance needs of each individual system and different property owner attitudes toward system care.

Additional issues which must also be considered in the method of cost allocation include ways to meet future needs of the community, arrangements for cluster systems, and various household income levels within the service area.

The framework for developing an organization for a community water and wastewater management system must reflect the needs and goals of the community. Table 5-1 summarizes the range of capabilities and powers an organization can possess.

TABLE 5-1

POWERS AND AUTHORITIES OF MANAGEMENT ORGANIZATIONS

- The power to issue and enforce regulations.
- The authority to own and operate wastewater facilities.
- The right of access to private property to inspect systems and correct malfunctions.
- The ability to raise revenues by setting and collecting user charges and fees, and levying assessments and taxes on benefited properties.
- The authority to acquire by purchase, grant, and/or lease, both real and personal property.
- The power to declare and abate nuisances, to require and recommend correction procedures, and to perform corrections and bill the property owner if he fails to repair the system.
- The authority to plan and control how and when wastewater services will be provided within the community.
- The ability to receive state and Federal grants to build wastewater facilities, to incur debt obligations by borrowing or issuing bonds, and to sue and be sued.
- The ability to contract and delegate responsibilities to qualified persons or firms for the performance of any or all management functions.
- The ability to license, train, or certify persons involved in system design, installation, maintenance, and residuals disposal.

Planning and Design

Onsite and point-of-use techniques have been traditionally viewed by engineers, planners and others involved in community development as a temporary means of treatment until central systems become available. This perception, however, is changing as those involved in community planning are beginning to recognize that properly designed and constructed small systems are viable alternatives to central systems.

One of the main issues which concern engineers and planners is the lack of uniformity in design criteria and approval procedures. A review of State agency requirements revealed that most States have regulations concerning onsite treatment of wastewater; however, most States did not have any procedures pertaining to point-of-use water treatement. Several State health officials expressed a strong predisposition toward central treatment but others were open to individual alternatives. Given limited resources, philosophical objections, and perceived low priority, some agencies are reluctant to accept responsibility for regulating non-central alternatives.

FmHA not being a regulatory agency must rely heavily on State and other Federal agencies to assure proper regulatory control. Applicants should work closely with State health agencies early in the planning phase to address the problems associated with design standards and regulatory controls.

Defining boundaries for the service area when considering individual systems raises another issue. Various alternatives may represent tradeoffs between the degree of centralization or individual systems and the plan for extending service to undeveloped land within the service area. Any plan must be closely tied to public acceptance of service area boundaries, environmental considerations and land use controls.

Construction

A problem recognized as contributing to failures for point-of-use and onsite systems has been poor construction practices. Although not perceived as critical problems, special attention should be given to construction and installation techniques to assure customer satisfaction. Even though the construction techniques are not technically sophisticated, the work involves a considerable disturbance of private property. Special provision may be necessary in construction contracts to assure that the contractor takes precautions to limit disturbance to private property and where disturbed, the property is adequately restored. The owner may also be advised to implement a program to inform the public of what to expect and adequate means of providing access to private property for construction.

Operation

The issues associated with operation are related to ownership issues and management capability and powers. Individual facilities can generally be owned and operated in the following ways:

- Privately owned and operated.
- Privately owned and operated within the guidelines of a public entity.
- Privately owned and publicly managed.
- Publicly owned and managed.

Responsibilities relating to the ownership and operation of individual systems depend on whether explicit State legislation allows the owner to enter onto private property to conduct operational functions. In lieu of specific State legislation, the following options have been recognized by EPA:

- Obtain a service agreement with each resident with an individual system. The service agreement would indicate the homeowner's and local entity's responsibilities in system maintenance and would allow the entity access to individual systems for operation.

- Obtain easements to the individual systems.

- Purchase the individual systems (i.e. public ownership of the system).

- Require property owners with individual systems to establish service contracts with private firms. The firms would report results of the inspections to the local entity.

For point-of-use or onsite devices to function properly, they must be properly installed, maintained as needed, and usually for the treatment media to be replaced, reconditioned, or backwashed. For the system operator to provide these functions would be very time consuming. For the customer to do so would involve some form of training and follow-up measures to determine that the system is being properly maintained. Under either method or some combination, the plan of operation must allow sufficient time and expense to assure that the users are receiving proper service.

In assessing the operation scheme, the following evaluation factors may be used:

- Legal authority to provide management functions.

- Capability and willingness to perform administrative duties.

- Political acceptability and public support for the arrangement.

6. ECONOMIC EVALUATION

This section describes the criteria and methodology for economic evaluation of point-of-use water treatment and onsite waste disposal facilities under the central control and management of a public utility or a public association.

Although the cost components of these facilities are described in general terms, i.e. not specific to a particular design or system, the methodologies outlined in this chapter will illustrate the factors which are important to an economic evaluation of point-of-use water treatment or onsite waste treatment facilities.

In applying these methods the assumption is that the issues relating to service area and system design have already been made and that a uniform method is now to be applied to evaluate the "cost" or "saving" of selected alternatives.

The objective of an economic evaluation is to establish and quantify the "measure" or "measures" which best represent the cost or savings (income) of alternative designs. The cost or savings measure(s) are then used in

the overall cost effectiveness evaluation in which other factors are included in the analysis.

Costs to be Considered in the Economic Evaluation

1. First Cost: The cost to design, construct, erect, install, start up and test the specific facility or component. It includes a fair pro-rata share of all costs associated with planning and implementing the design. Cost of borrowed money or income forgone on investment during the construction period is also included.

2. Maintenance Cost: The cost involved in maintaining the system in good working order. This is normal maintenance which is required to keep the system working efficiently and to avoid premature component failure or replacement.

3. Operations Cost: The cost required to operate the system. It includes consumed chemicals, power, etc. Direct labor costs and a pro-rata share of general overhead costs are also included.

4. Replacement Cost: This is the cost to replace major components of the system. Each system component will eventually wear out or otherwise need replacement to keep the system operating properly. It could be a scheduled replacement to minimize unpredictable failures or a replacement which is done upon component failure. The costs

under this category generally occur less frequently than maintenance cost.

Value of System at End of the Planning Period

1. Salvage Value: This is the value of the system or system components at the end of the component or system life. It is intended to represent the additional income or loss which would result by the sale or removal of the system or component. It is not depreciated value.

2. Depreciated Value: The remaining value of a system component based on the remaining useful life. It is computed by taking the ratio of remaining life to system or component life and multiplying this ratio by the first cost of the system or component.

3. Value in Use: As used in this section it is the remaining economic value of a facility or component at the end of the planning period. It may be the depreciated value if there is no other reasonable measure to estimate future benefits.

Factors Considered in the Economic Evaluation

1. Cash Flow: The series of costs, savings, and incomes occurring each year over the planning period. These amounts are always expressed in current or base year dollars.

2. <u>Constant (Base Year) Dollar Cost</u>: The adjusted cost, value or savings which represents the equivalent cost in a given base year; i.e., if the purchasing power of the dollar will increase 1.5 times over a period of time from the base year then the cost of services must be divided by 1.5 to obtain the cost in Constant (Base Year) Dollars. In general, if the cost of a particular item is expected to increase at the same rate as general inflation in the economy, then the cost of the item in constant dollars at some future time would be the same as the cost of that item in the base year.

3. <u>Discount Rate (DR)</u>: The percentage used to evaluate the time value of money.

The discount rate may vary depending upon whose point of view is considered in the analysis. It may even be zero to indicate that funds do not have any real investment potential.

In any event the value selected should be based upon a reasonable estimate of the alternative investment potential of funds. It should not be selected to favor one alternative over another.

In the absence of other criteria, a simple method for selecting the discount rate would be the prime rate less the estimated rate of general inflation in the economy.

4. <u>Base Planning Year</u>: The base year for the planning period. This is the start of the planning period. It is time zero. It may be when construction begins or after start up.

5. <u>Planning Period</u>: This is the period over which the economic evaluation is conducted.

When considering point-of-use systems and onsite waste treatment facilities, it is important to recognize that these may be only interim solutions to the overall problem of providing adequate water supply and waste treatment services within a given service area. The long-term solution may include bringing these individual facilities into the central water supply and waste treatment systems. Therefore, in these instances, the planning period should be long enough to include the economic impact of this transition.

In general, the planning period should be long enough to represent the typical costs involved in building, constructing, operating and maintaining the complete system. It should not cut off before a major increase in costs such as system replacements or scheduled overhaul.

6. <u>Component Life</u>: This is the period of time over which, on the average, a component of the system must be replaced to maintain the system in good working order.

7. System Life: This is the "average" life of the completed system. It may be computed by taking the weighted average, on a component-by-component basis, of the component life times its first cost and dividing the sum by the total first cost of all components.

8. Discounted Present Value (DPV): The time equivalent value of future cost, values or savings in the Base Planning Year.

$$DPV = (\text{Future Value})/(1 + DR/100)^N$$

Where: N is the number of years in the future from the Base Planning Year.

9. Net Present Value (NPV): The sum of the discounted present value of all costs, savings, values indicated by the cash flow.

General Rules for Preparing an Economic Evaluation

1. The planning period must be identical for all design alternatives evaluated. The technique in the economic evaluation would then be to compute the Net Present Value of each alternative and then, if desired, expressing this as an equivalent annual cost over the planning period.

2. All cost, savings, values must be expressed in constant or base year dollars, i.e., all cost savings must be adjusted to represent equivalent purchasing power dollars.

3. The discount rate used to determine the present value of costs or savings must be the same for all alternatives evaluated.

4. The Base Planning Year must be the same for all alternatives evaluated.

5. The cost must be based upon equal service area. If other service areas are to be considered, a separate economic evaluation should be performed for the other service areas. Comparison of different service areas will consider the economic cost as only one factor in the overall evaluation.

6. All expenses should be counted in the evaluation at the time the expense occurred. If borrowed funds are used to pay for an expense such as the initial construction, this cost of borrowed money or the annual repayment should not be included in the economic analysis. This is a matter for the financial analysis. There is no doubt that the cost of borrowed money or the availability of grant funds do play a role of determining the "least costly" system from the point of view of the public utility. However, from the point of view of the good use of resources and "real" costs, these factors will only distort the economic evaluation.

7. Consider all the costs involved regardless of who must pay. With central systems, consider the cost associated with connecting users

to the system. With non-central systems, consider any site improvements necessary to make the facility fully functional. In both cases, include any cost necessary to meet growth demands.

7. ENVIRONMENTAL CONSIDERATIONS

In considering the feasibility of alternative methods for meeting water supply or sewage treatment needs, an important consideration is the environmental impacts of the alternatives under study. Normally, this alternative analysis is done for a specific geographical area, the proposed service area. Some broad and general comparisons, however, can be made concerning the potential environmental impacts of individual systems versus central systems.

Construction Impacts

The major components of a rural community central system are normally built within a relatively brief construction schedule, approximately twelve months, and the locations of the construction sites are totally interdependent on other system components. Individual systems, on the other hand, are generally not built within a specific time frame but are built as needed. Their locations can often be totally independent from the last systems built. Consequently, the environmental impacts associated with the construction of individual systems should generally be less because 1) they are more dispersed over time and 2) they are less concentrated in specific areas. The environment is more able to absorb

these impacts without being adversely affected. Also, because of the greater flexibility in locating individual systems, construction impacts to environmentally sensitive areas, such as floodplains and wetlands, can be more readily avoided.

Operational Impacts

This discussion assumes that individual systems, when properly designed and selected for the supply or treatment problem at hand, provide levels of performance equivalent to central systems. Incidents of nonperformance or malfunctions do occur for both types of systems, however, and would normally be more frequent and remain undetected longer for individual systems. This results because of the greater number and dispersion of treatment units within a service area composed of individual systems. Central systems, although more easily monitored and controlled, do have the potential to create a greater degree of adverse environmental impact per malfunction.

If some form of chemical treatment or maintenance activity by the user is required as part of the individual system, there is a greater chance of chemical misuse and mishandling than with a central system, given the greater number of untrained users involved. Central system and treatment processes, on the other hand, often produce high concentrations of wastes and by-products that can adversely affect the environment if not properly handled. Finally, adverse environmental impacts associated with

groundwater transfer are less likely when point-of-use water supply is combined with onsite sewage treatment.

Long-term Land Use Impacts

Individual systems and central systems cannot be compared in a vacuum in terms of their long-term land use impacts. The design of water supply and sewage treatment systems cannot and should not be used as a substitute for local land use planning. Local zoning ordinances and land use plans and their day-to-day implementation determine land use patterns. Where this is poorly done, poor land use results regardless of whether central systems or individual systems are used to meet water supply and sewage treatment needs.

Assuming that an effective land use planning process is in place within a proposed service area, this discussion addresses the advantages and disadvantages to land use planners posed by central and individual systems. The major land use advantage of central systems is that they can accommodate greater densities and varieties of development than individual systems. Coupled with mandatory hookup policies, central systems allow planners to attract new development to more confined areas and to areas capable of supporting high density use. As a result, land can be more efficiently used.

A central system's biggest land use advantage becomes its environmental downfall when this system is used in areas that are either

(1) environmentally incapable of supporting high density use such as floodplains, or (2) designated for public policy reasons for some level of conservation, such as important farmland. As distribution or collection lines are laid in these areas, an almost irretrievable commitment to conversion results given the economic pressures to obtain new connections in order to generate more income and given the legal difficulties of refusing service to a new customer which the system could otherwise adequately provide.

Individual systems, on the other hand, give land use planners greater flexibility in dealing with the needs of areas designated for lower density use because of environmental or other public policy reasons. They also provide greater planning flexibility because they provide more time in which to make and remake land use decisions. Such decisions are not locked in by the burying of extensive pipeline systems and the construction of large, single treatment or supply sources. For individual systems, decisions to provide service can be made for much smaller areas, as far down as the individual lot, and therefore, carry much less precedential value. If poor land use patterns develop, there is a greater ability to stop and revise the development trend.

Just as with central systems, however, if decisions to provide individual water or sewer service are not coupled with a strong, local land use planning process, the potential exists for major land use problems. Scattered or shotgun growth, particularly residential in nature, is an inherent risk of the uncontrolled location of onsite systems. The

inefficient use of land is one of the many obvious resulting problems. The risk is further multiplied if with the inception of a centrally managed network of individual systems, it becomes cheaper for a landowner to have an individual system. Such a condition, without proper local land use controls, would increase the exodus of residential, commercial, and industrial uses from developed areas to the countryside.

In summary, both central and individual systems pose advantages and disadvantages to good land use. Public bodies engaged in coordinating sewer and water service with land use planning must recognize these advantages and disadvantages and choose the systems or combination of systems which help meet rather than exacerbate their intended land use results.

8. FEDERAL AND STATE AGENCIES

The Department of Housing and Urban Development and the Environmental Protection Agency have addressed individual systems within their respective program areas. Their policies are summarized below.

Housing and Urban Development (HUD)

HUD regulations on Minimum Property Standards for one and two family dwellings establish certain requirements for point-of-use water systems. Water that requires continuing or repetitive treatment to be safe bacterially or chemically is not acceptable. Point-of-use dwelling water purification units are not an acceptable alternative but may be used to improve acceptable water.

Environmental Protection Agency (EPA)

In the supplementary information to proposed rulemaking (50 FR 46902, November 13, 1985) for the National Primary Drinking Water Regulations on Volatile Synthetic Organic Chemicals (VOC), EPA expressed its views on point-of-use water treatment devices. EPA believes that because point-of-use devices are different from central treatment alternatives, and present

a potential that public health will not be protected to the same degree as central treatment, it is important to establish minimum criteria for operation, maintenance and testing of these devices. The State or EPA would have to assure that:

- The facility is centrally owned and controlled and it would be the responsibility of the public water system to own, operate and maintain all parts of the system.

- An effective monitoring and surveillance scheme is developed and approved. The monitoring scheme must provide health protection equivalent to a monitoring scheme for central water treatment.

- Effective technology is applied. The State would have to require adequate certification of performance, field testing, and a rigorous engineering design review.

- Microbiological safety of the water is maintained. Some devices increase the tendency for higher bacterial concentrations. Operation, maintenance and monitoring activities must ensure that the microbiological safety of the water is not compromised.

- All consumers are to be protected. The State must assure that every building is covered by treatment and monitoring.

- There must be no significant increase in risk over centrally treated water. Health protection must be equivalent to a central system.

EPA regulations on State and Local Assistance, Grants for Construction of Treatment Works (sewer) describe requirements which apply to privately owned onsite systems. An eligible applicant may apply for a grant to build privately owned treatment works serving one or more principal residents or small commercial establishments.

In such case the applicant shall:

- Demonstrate that the total cost and environmental impact of building individual systems will be less than the cost of a conventional (central) system;

- Certify that structure was in use on or before December 27, 1977;

- Apply on behalf of a number of individual units;

- Certify that public ownership is not feasible and list the reasons; and

- Certify that such treatment works will be properly operated and maintained and will comply with all other requirements of Section 204 of the Clean Water Act.

Applicants for privately owned onsite systems shall provide assurance of access to the systems at all reasonable times for such purposes as inspection, monitoring, building, operation, rehabilitation and replacement.

Privately owned onsite systems generally qualify as innovative or alternative technologies and may be eligible to receive increased EPA grants.

State Agencies

An informal survey of a majority of State agencies responsible for water and wastewater systems indicated that most States have rules, regulations, or established policies for onsite wastewater facilities. The reverse was found for point-of-use water facilities, where few States were found to be active in this area. However, FmHA has financed systems using point-of-use technology in 3 States and onsite technology in 5 States.

The policies and regulations varied from State to State. Following are examples of the States' approaches.

California:

State legislation is being considered to prohibit deceptive selling practices by vendors of home water treatment devices. The bill makes it unlawful to make false statements and claims regarding the performance of point-of-use water treatment devices.

Florida:

Florida officials indicate a preference for central water distribution systems and indicated point-of-use systems were not believed to be economically or environmentally feasible.

Georgia:

The State has a publication entitled "Rules and Regulations for On-Site Sewage Management System" which describes the State's regulations in this area. The rules cover the permitting and design of onsite facilities but also require connection to a central system if available. The rules recognize onsite management systems in subdivisions with certain restrictions.

Nebraska:

Individual point-of-use water treatment where there is bacteriological contamination is not acceptable. Where the water quality is otherwise

unacceptable, an individual point-of-use system could be used if it can be demonstrated that the system will provide acceptable treatment. Onsite wastewater systems would be reviewed on a case-by-case basis. The governing body would be required to monitor the operation and maintenance of the onsite systems. In both water and sewer areas the State encourages central facilities.

Wisconsin:

The State is receptive to point-of-use facilities with the following conditions:

- Must be more cost effective than a central facility
- Limited to small systems (normally 50 users or less)
- The utility must demonstrate the ability to adequately monitor and maintain the remote non-central equipment.

New York:

The State has legislation allowing municipalities to create special districts for point-of-use and onsite facilities. Water Quality Districts are authorized to procure, install and maintain water quality treatment units or devices for the purpose of purifying contaminated, private

individual wells. Wastewater Disposal Districts have the authority to install, improve and maintain onsite septic tanks or cluster systems.

Virginia:

Individual and non-public water systems are required to comply with National Sanitation Foundation (NSF) standards for point-of-use treatment devices - Standard 42 (aesthetic) and Standard 53 (health effects). Certain types of point-of-use technology, primarily granular activated carbon, are also accepted on individual project basis.

Washington:

The State does not encourage or endorse point-of-use systems for private residents. Their stated reasons are:

- The difficulty and cost associated with pre-design studies required by the State to size and select home treatment units.

- The lack of laboratories certified to test for the presence of Giardia, organic contaminants, and other health related contaminants of concern.

- The difficulty encountered by the average homeowner in providing maintenance, repair, replacement, and monitoring of home treatment units.

- o Concern regarding the potential for degraded bacteriological water quality due to microbiological growth in the treatment unit.

- o A false sense of security on the part of the homeowner.

Connecticut:

The State has a program whereby grants are available to individual homeowners or a town to provide relief from a contaminated water supply.

Minnesota:

The Department of Health does not recommend the use of point-of-use water treatment devices to treat drinking water known to be contaminated. The reasons are twofold:

- o Lack of independent testing or certification of devices creates a great deal of uncertainty as to the reliability and effectiveness of proprietary treatment devices to adequately treat water in specific contamination situations.

- o Most point-of-use devices will continue to produce water even though it may not be removing the contaminants; therefore, a homeowner has no reliable way of determining the effectiveness of the treatment device.

In situations where private well contamination occurs on a widespread basis and construction of a central system may not be cost effective, consideration may be given to point-of-use devices. In such situations the conditions stated in EPA's proposed rulemaking for volatile synthetic organic chemicals (50 FR 46902, November 13, 1985) would apply.

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